RAILROAD GAZETTE

FRIDAY, JANUARY 4.

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Contributions.

Change of Gauge.

CINCINNATI, Dec. 31, 1888.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the *Gazette* of Dec. 28, in a report of the proceedings of the Engineers' Club of St. Louis, Dec. 19, I find the statement that the Ohio & Mississippi, narrow-gauged in 1871, "so far as known was the first six-foot road changed."

This is a mistake. The Illinois & Wisconsin Railroad (now the Wisconsin Division of the Chicago & Northwestern) was originally built on the 6 ft. gauge from Chicago northwest to Woodstock, Ill., 51 miles, and from Fond du Lac, Wis., south to La Crosse Junction (now known as Minnesota Junction), Wis., some 30 miles.

The Illinois section was narrowed in 1885 and the Wisconsin in 1856 to the 4 ft. 8½ in. gauge. E. P. CUTTER.

Justice for the Railroads.

BOSTON, Dec. 17, 1888.

TO THE EDITOR OF THE RAILROAD GAZETTE:

As an interesting commentary on the relations between railroads and the public, your readers should know of a case recently tried in a court at Providence, R. I. Railroads, which, as Commissioner Cooley says, are looked upon by the public as one solid body, banded together for evil purposes of various kinds, are accused of all sorts of wicked devices, and their officers are believed to sit up nights inventing new schemes to abuse the public. While not denying any part of this indictment which may be found to be true, I wish to simply set forth a bit of strong evidence on the other side.

On Jan. 4, 1887, a Boston & Albany passenger train was derailed at Mitteneague (West Springfield), Mass., and two or three cars burned up, it being the worst accident ever known on that road. One passenger was killed and a number injured. Among the latter were a man and his wife, on their way to Providence. R. I, their home. The woman at the time claimed that her injuries were of no account, and refused to let the company's physician examine her, and both she and her husband settled with the company on the spot, and signed receipts in full. But afterwards the woman had a long and painful disease of the bone, and a suit was brought against the road on the ground that the company maintained a faulty roadbed, ran the trains too fast, failed to properly inspect the train and roadbed, used poor iron in car axles and wheels, employed careless and inefficient employés, and neglected the injured passengers at the time of the accident and afterward. The persons claimed that they did not know what they were doing when they signed the receipts in settlement.

The Railroad Commissioners of Massachusetts made a very careful investigation of this accident and decided that the primary cause of the derailment was the breaking of a journal under the tender. The wheel thus derailed ran about three miles, until it came to a facing-point switch where it turned the train partially upon the side track. An examination of the broken journal showed that there had been a partial fracture some time previous to the final break, but it could not be seen by inspection nor discovered by sound. The axle had run upward of 97,000 miles. A sound axle of the same quality and make, which had run 120,000 miles, was broken under hydraulic pressure and showed a clean break and uniform texture of good iron throughout. The manufacturer testified that the road always bought axles made from railroad scrap, and that they were made by experienced men and carefully examined. Its diameter was 3¾ in., the M. C. B. standard. Nobody claimed that the coldness of the weather had any effect in causing the breakage. The railroad commissioners recount all these points at length, but do not utter any condemnation or reproof of the company, laying the chief stress on the question of fires in cars, in which matter the road is commended for faithfully trying to secure the best system of continuous heating.

Now, in the face of all this, these Providence parties have sued, 18 months afterwards, for $30,000 (between them). The road went to the expense of taking fifteen or twenty of its officers and or employés from Springfield and Albany to Providence, and of course refuted the absurd claims of the plaintiffs, but in spite of this, and in disregard of the opinion of so high an authority as the Massachusetts commission, which doubtless would, if placed before the highest court, go far toward relieving the road from all responsibility whatever, the jury awarded the man $250 and his wife $500. The smallness of these sums compared with the amount asked indicates quite clearly that the jury, like most other juries, simply gave the complainants this small amount as an evidence of sympathy, and, to speak plainly, to get rid of them. But in being compelled to pay even this small figure, added to the large expense and inconvenience of defending the suit at such a distance, the company is made to suffer injustice. It had settled in full; a competent tribunal had decided that the officers had used due diligence to provide safe cars, engines and tracks, and to handle trains carefully, and yet a court is found to approve the punishment of the company. A householder, or the proprietor of a hack or a livery stable would, under such circumstances, be let off free without a moment's reflection. This shows that it is the treasury of the railroad company and not the justice of the claim that fills the chief place in the jury's eyes. It is the old case of taking money from the rich and giving it to the poor, simply because one party is rich and the other poor.

A. B. C.

The Inspector of Agencies.

SAVANNAH, Ga., Dec. 27, 1888.

TO THE EDITOR OF THE RAILROAD GAZETTE:

On most roads the duty of the inspector is to reach an agency at some unexpected hour, examine the accounts and ascertain if the amounts remitted and the amount on hand balance with the agent's books. Should this be found correct the inspection has been completed.

It seems to me that an inspector's duty should not end here; he has performed only about one-half the duty that he, or some other authorized person, should.

There are many ways in which an agent can either directly or indirectly, ignorantly or otherwise, entail a much greater loss on a company than by being a few dollars short in his accounts, always considered the gravest of offenses. These other ways are of more importance than they sometimes appear, and to guard against them is a worthy object. It should receive much more attention than it does. If all vacancies could be filled by thoroughly experienced and competent men the necessity for any improvement on present methods would not be so apparent; but it frequently happens, especially on the smaller roads, that the less important agencies have to be filled by young men of little experience; the revenue being small, the company cannot do otherwise than pay a small salary, and this means an inferior man.

True, the duties are not difficult, and if the agent is a bright fellow he will get along and learn his work, but if he had some one thoroughly competent to *instruct* him in the *beginning* just how everything should be done, he would, with an occasional visit from time to time thereafter, to see that everything was conducted in a proper and businesslike manner, probably develop into a good man, and the company be the gainer thereby. Without this he simply learns to do the work in his own way. To get started right means a great deal. Then, too, it often happens that a man, with no one to watch his movements now and then, and go over all the details of the work with him, will fall into habits of doing his work which may lead to errors and subsequent losses to the company. Men often learn some short method of getting through with their business, which may work out all right for a long time and result in an error in the end. This may not be a direct violation of any rule of the company, but merely a departure from correct business methods. To illustrate this, I may mention a case of a shipment of freight that was once made which had to pass one junction point before reaching destination. The cars, way-bills and train guide were all turned over at the junction, and yet there was a delay of several days at that point, caused by the agent checking the cars from the train guide, which erroneously showed the junction point as the final destination. Had he checked the cars with the way-bills, as he should have done, he would have found that the cars were over at his station; and yet this way of checking had been his customary way. It finally resulted, as was almost certain, in an error and loss to the company.

Is it not possible, with proper inspection, to discover these loose habits of doing business before the company sustains a loss? To discharge the man after the error has been committed does not reimburse the company for the loss it has sustained. To correct defective systems and detect departures from correct methods *before* loss is sustained should be the constant aim of the officers responsible for the service.

It appears to me that great good might be accomplished in this direction by having the Inspector of Agencies, each time he inspects an agent's accounts, also to go over all other matters pertaining to the agent's duties, and whenever and wherever he finds that there has been any departure from the rules or from correct methods of conducting the business, instruct him how it should be done. When necessary, the inspector should of course advise his superior officer of the state of affairs, that proper action may be taken. There should certainly be some one to look after this detail work, more than there ever has been yet. As it is now, the result of some error is the first intimation at headquarters that there has been any irregularity going on. The proper man to do this is the inspector, and he should be a thoroughly experienced man in the business, and not only know just how everything should be done, but be quick to detect any errors

Another very important point that this official should keep a close watch over, especially with the inexperienced agents, is the manner in which the agent represents the railroad toward its patrons. There is a great deal involved in the treatment that patrons receive, and an agent cannot be too well acquainted with the people with whom he does business, their habits and prejudices. He ought to be particular to make himself and the company he represents popular among them all. The advice of a thoroughly experienced man on this point will aid him very materially.

I have only outlined this subject in a general way. The minor details could be modified as circumstances should require, but every superintendent must feel the necessity of having some one authorized to follow up these matters more closely than they now are. W. W. SYLVESTER.

Transition Curves.*

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FROM THE GERMAN, BY E. A. GIESELER.

1. GENERAL CONSIDERATION.

Railroad engineers very generally recognize the good results which may follow the use of transition curves, in reducing the swaying of trains and the lateral shocks, and the consequent increase in comfort and safety, and the decrease in the wear of rolling stock. Nevertheless the actual use of such curves in this country is limited. The methods of laying them out which have been hitherto developed are somewhat complicated, and it has been considered troublesome to keep them in true line. In the following paper, which is a translation from the German of Sarrazin and Oberbeck, the equation of the transition curve is developed, its characteristic and important features discussed, and simple methods of laying out (by the use of tables) are given.

Superelevation.—Suppose R to be the radius of a curve, v the velocity in feet per second of a train passing through it, and g the distance between centres of rails; then we have for e, the required elevation of outer rail—

$$(1) \qquad e = \frac{g\,v^2}{32.2\,R}$$

and for $g = 4.9$, which is about its value for the standard gauge of 4 ft. 8½ in.:

$$(2) \qquad e = 0.152\,\frac{v^2}{R}$$

In the following discussion it is assumed that the full amount of this elevation is obtained gradually by introducing a uniform slope into one of the two rails of the track. Corresponding to this, theory would then demand the introduction, between the tangent point and the circular curve, of a transition curve, the gradually decreasing radius of which at each point corresponds to the gradually increasing elevation of outer rail, until at the point where such transition curve meets and is tangent to the circular curve, the radii of both are equal, while at the same time the full amount of elevation of outer rail has been obtained.

In fixing the slope of the rail we cannot, however, be guided by theory alone, but then circumstances must be considered which actually influence the movements of the rolling stock without being susceptible to theoretical computation. The latter assumes a uniform motion of the vehicles on the centre line of the track, an assumption which does not correspond with reality. During their motion the vehicles sway laterally, whereby blows are imparted, which become especially apparent when, on entering a curve, the direction of such lateral blows is opposed to the direction of curvature; for instance, when a vehicle on entering a curve leading to the right happens to experience a blow directed to the left.

This points to the advisability of commencing the elevation of the outer rail on the straight line before the tangent point, so that on entering the curve the vehicle already has an inclined position, whereby a centripetal force counteracting centrifugal blows, is created. The same arrangement will be favorable for vehicles on their passage from the curve into the tangent.

The amount of elevation to be given to the outer rail at the tangent point cannot very well be determined theoretically, it being impossible to compute the force of the lateral blows. Extensive practical experiments, which have been made with a constant length of transition curve, but different lengths of the slope of the rail, have shown that the entry into the curve, as well as the passage out of it, takes place in a very smoth way, when at the commencement of the curve the rail already has half of the entire elevation required. If, therefore, at the commencement of the circular curve, the rail is to have the full elevation, as it should, then it follows that the entire length of slope must be made equal to twice the length of the transition curve and half of such slope be on the tangent, while the other half is on the transition curve.

This rule is to be recommended all the more the shorter the radius of the curve. But, considering that in country where the sharpest curves have to be resorted to, there frequently is room for only short tangents between reversed curves, it is advisable to admit of a certain freedom in the arrangement of the slope. It should, however, be made a rule not to shorten it any more than necessary, and to reduce it to the length of the transition curve only when positively compelled to do so.

The question might arise whether in increasing the length of slope the transition curve should not be lengthened correspondingly in accordance with its equation as deduced below. But in connection with the different lengths of slope necessitated by the above practical considerations, this would require different lengths of transition curve for one and the same radius, the ordinates of which would have to be computed for each individual case. Again, the object of counteracting lateral shocks at the entrance of the vehicle

* The above article, which will be continued, is the introduction to a paper on "Transition Curves," published by the Brandis Manufacturing Company, 55 Fulton street, New York.

into the curve would be attained but imperfectly, as there would be no elevation of outer rail at the commencement of the curve.

For these reasons the appended tables have been computed under the assumption of the final elevation of outer rail being obtained during the course of the transition curve, while the lengthening of the slope recommended above has to be introduced as a subsequent correction. Experience shows that the favorable influence exercised by gradual transition from longer to shorter radii of curvature is in no way counteracted by this correction, and it would therefore be erroneous to look upon inserting parabolic transition curves under these circumstances as superfluous.

A certain freedom in the arrangement of the slope is desirable, not only for the reasons mentioned above, but also with regard to which rail is to be sloped. The elevation may be obtained through raising the outer rail, through depressing the inner rail, or through a combination of both methods. The latter method is theoretically the most correct one, because it avoids the lifting of the centre of gravity of the vehicles. Yet the other two methods are usually preferred because they allow one of the two rails to follow the grade of the road, whereby track work is simplified. In double track roads, on account of road crossings, the rule should be adopted to follow the normal grade in each track with that rail which is nearest to the centre of road-bed, that is to produce the elevation in the *outer* track by *raising* the *outer* rail, and in the *inner* track by *depressing* the *inner* rail. In this way the advantage is obtained for crossings of no change of grade from rise to fall taking place inside of the road-bed. Again, all arbitrariness in regard to the arrangement is excluded in a most simple and effective manner by following this rule.

When two reversed curves follow each other, then the application of this rule will have the advantage that the slopes in each rail are inclined in the same direction, and if the intervening tangent in a case of this kind is short, then it is advisable to gradually merge one slope into the other, whereby the torsional motion which the vehicles are subjected to at the ends of the curves is made more even. This should be remembered when discussing the question of the least length of tangent to be inserted between two reversed curves. Say, for instance, that two 3-degree reversed curves are to follow each other within as short a distance as possible, then the length of slope for each will be $2 \times 68 = 136$ ft. (see equation 24 further on). Now, inasmuch as half of the slope will be on the tangent, there must be 136 ft. of tangent to accommodate these two halves, and also to obtain a continuous slope of 272 ft. in length. Now, if it is desirable for particular reasons to depart slightly either one way or the other from the above given length of tangent, the continuous slope is still maintained by merely changing the grade correspondingly.

When the reversed curves are of different radii, and consequently the slopes pertaining to them of different grade, then it is advisable to elevate the commencing point of each transition curve one-half, and to give the connecting tangent a uniform slope between the points so fixed. If l is the length of one and l' the length of the other transition curve, then the length of tangent should not, if possible, be less than $l + l'$.

The introduction of a short tangent between two curves deflecting in the same direction should be avoided as much as possible, because it is unfavorable to the smooth motion of a train if an existing elevation is abandoned only to be resumed immediately afterwards. In cases of this kind it is better to join both curves into one of larger radius, or to insert between them a somewhat flatter curve.

We now proceed to discuss the nature of the transition curve and to develop its equation.

(TO BE CONTINUED.)

Heavy Consolidation Locomotive—Philadelphia & Reading.

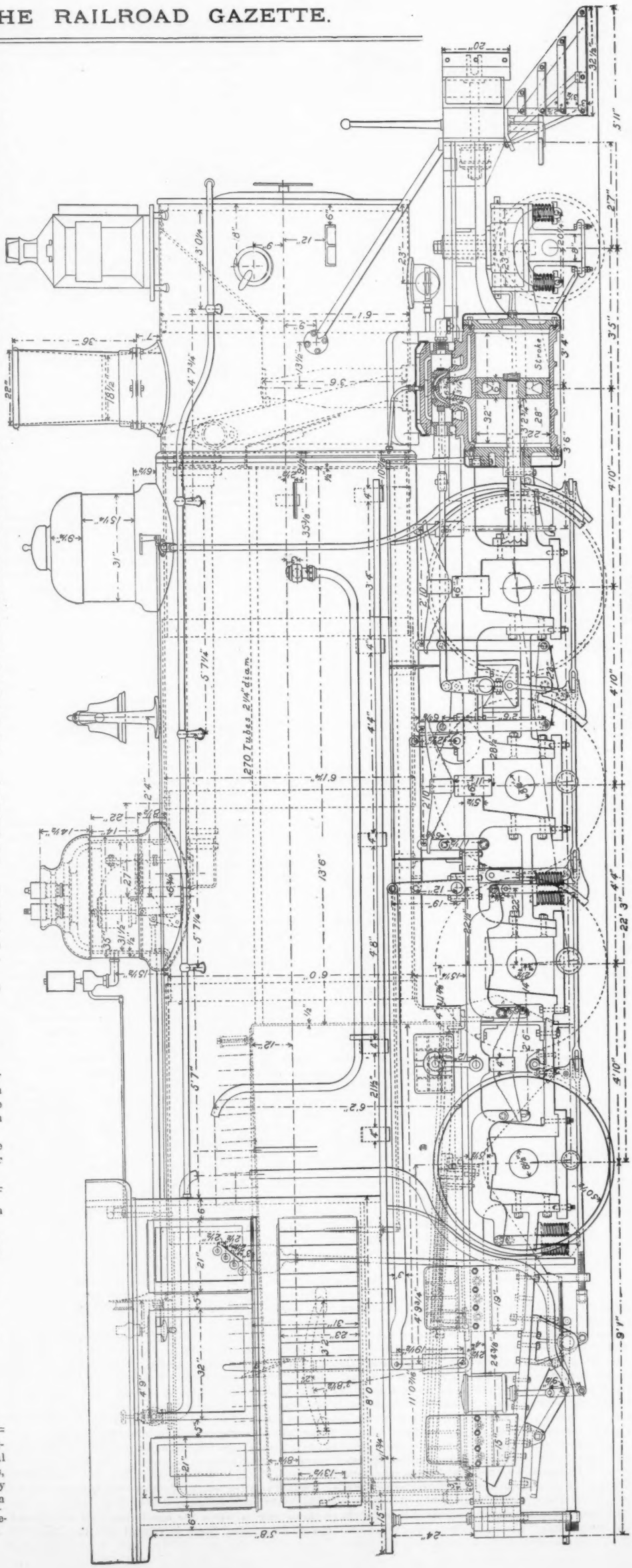
The accompanying engravings represent some very heavy consolidation locomotives, designed for mountain service on the Philadelphia & Reading, by Mr. G. W. Cushing, late Superintendent of Motive Power, and built by the Baldwin Locomotive Works.

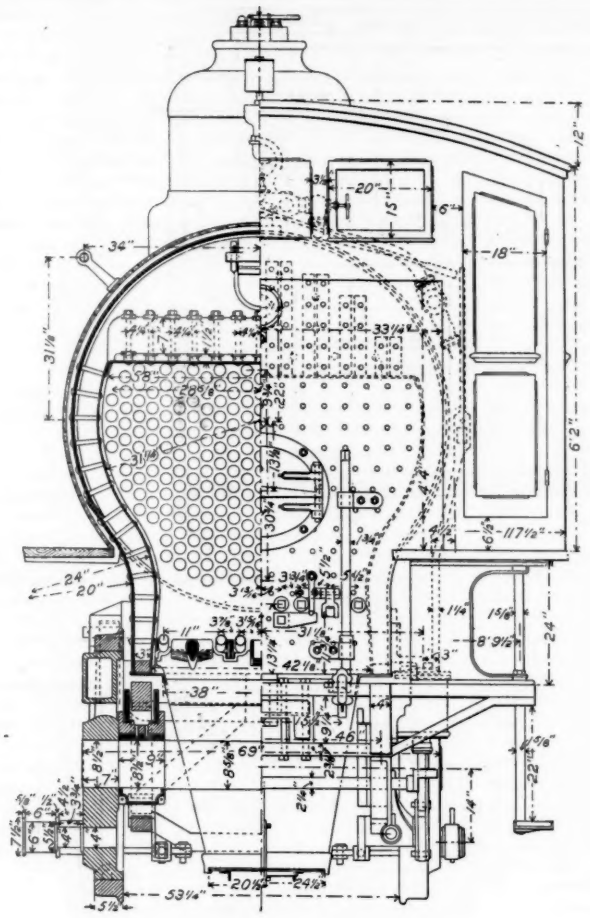
The accompanying comparative table gives an idea of the relative size and power of this engine, as compared with other exceptionally heavy locomotives.*

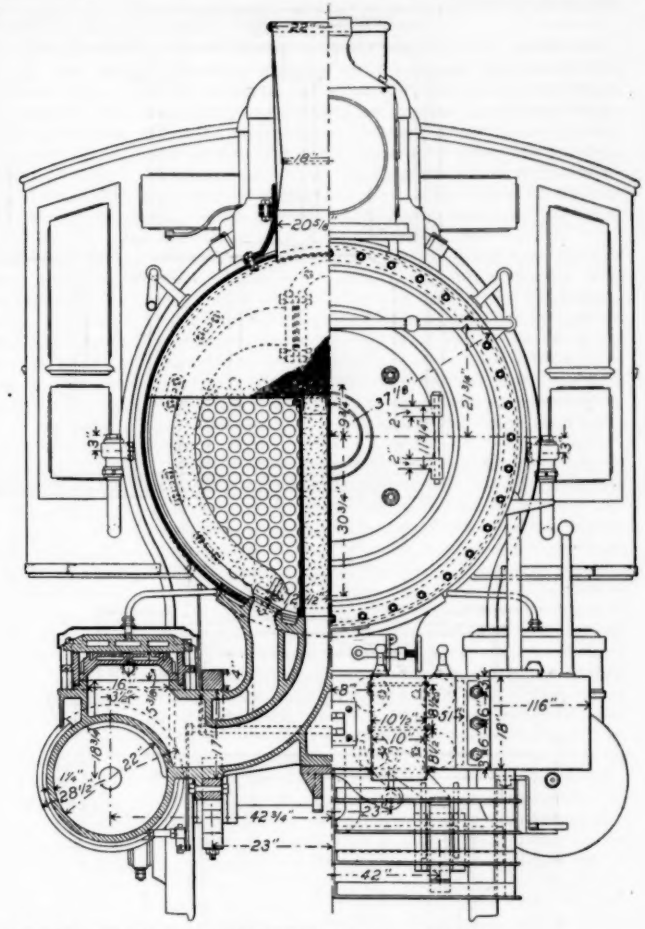
Maker	Central Pacific	Baldwin	Beyer Peacock	Baldwin
Date built	1884	1885	1886	1888
Railroad	Central Pacific	Brazil	Mersey Tunnel.	Phila. & Reading.
Type	El Gobernador	Decapod	10-wheel tank	Consolidation
Cylinders dia. and stroke	21×26	22×26	21 × 26	22 × 28
Drivers, dia., ins.	57	45	55	50
Weight on drivers, lbs.	121,600	128,000	115,556	138,000
Tractive force per lb. average pressure in cyls., lbs.	278.6	279.6	208.5	271.0
Boiler pressure			150	140

The specifications called for 150,000 lbs. weight in working order, with 135,000 lbs. on drivers. The actual total working weight is 153,040 lbs. and 138,340 lbs. on drivers, otherwise the following specifications have been closely adhered to in the construction of the engine. The Northern

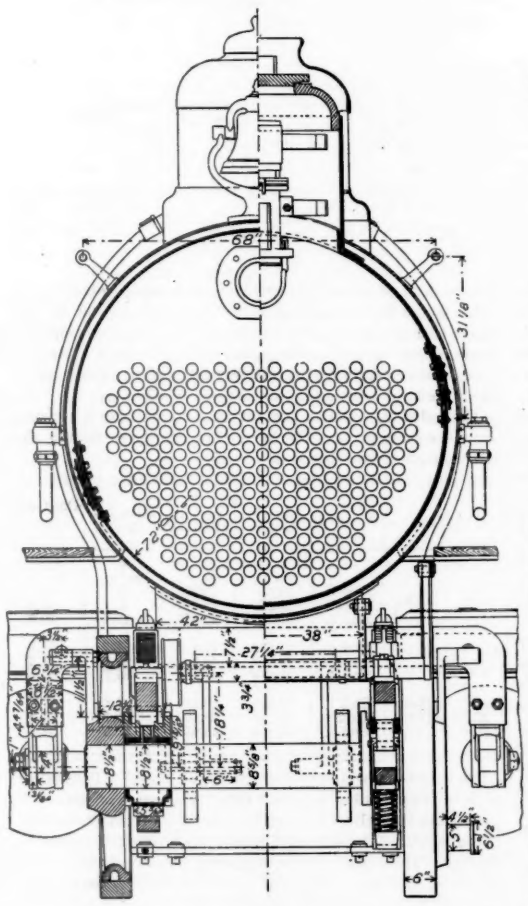
* The first three engines in this table are illustrated and described in *Recent Locomotives*, enlarged edition.


270 Tubes, 2¼" diam.
13'6"
Stroke
HEAVY CONSOLIDATION LOCOMOTIVE, PHILADELPHIA & READING.
Designed by Mr. G. W. Cushing, late Superintendent Motive Power.
Built by The Baldwin Locomotive Works, Philadelphia, Pa.





HEAVY CONSOLIDATION LOCOMOTIVE, PHILADELPHIA & READING.



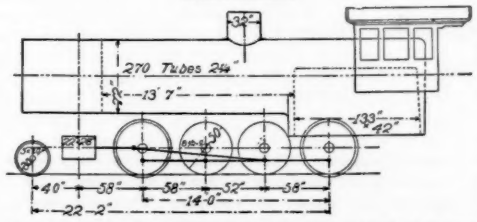
Pacific is now receiving 13 engines from the same specifications, adapted to burn bituminous coal.

The most noticeable feature about the engine is the great size of the boiler, which is 6 ft. diameter and 13 ft. 6 in. long over tube sheets. The fire-box is on an equally large scale, being slightly over 11 ft. long inside by 42 in. wide. The fire-box is placed above the frames, but not above the wheels as in the Wootten engines. The engine illustrated is designed to burn anthracite, but is not intended, like the Wootten, for the use of buckwheat or refuse coal.

It thus appears that as regards tractive power and adhesion the engines illustrated have few, if any, superiors. The third engine referred to in the foregoing table being a tank engine, the weight on the drivers is less when the fuel and water are consumed. The weights given are with tank and coal box full. All these engines are designed for use on exceptionally heavy grades.

The following specification in conjunction with the illustrations gives a very good idea of the size and design of this exceptionally powerful locomotive.

SPECIFICATION.



General Description.—Consolidation pattern freight locomotive engine, having eight coupled wheels and two-wheeled swing bolster truck. Cylinders, 22 × 28 in.; driving wheels, 50 in. diameter; gauge, 4 ft. 8½ in.; fuel, anthracite coal.

Total wheel base, 22 ft. 2 in.	
Driving wheel base, 14 ft.	
Wheel base of locomotive and tender, 50 ft.	
Rigid wheel base, 14 ft.	
Weight in working order, total 153,000 lbs.	
Weight on drivers, 138,000 lbs.	
Weight of tender with fuel and water, about 80,000 lbs.	
Heating surface of fire-box, sq. ft	185
Heating surface of tubes, "	2,160
Total heating surface, "	2,345
Heating surface per sq. in. of cylinder area, sq. ft	3.08
Area of flue openings, sq. in	848
Sq. in. of cylinder area to 1 sq. in. flue opening	.89
Steam pressure	140 lbs.

Boiler.—Made throughout of flange plates of homogeneous cast steel, Park Bros. or Otis make preferred, ⅝ in. thick; riveted with 1-in. rivets placed not over 3 in. centre to centre. All longitudinal seams and butt seams with welt strips inside and outside, double riveted. Throat sheet ⅛ in. thicker than the shell of boiler, to prevent undue thinning where flanged. All parts well and thoroughly stayed, and extra welt pieces riveted to inside of side sheet, providing double thickness of metal for studs of expansion braces. All plates planed at edges, and caulked with round-pointed caulking-tool, insuring plates against injury by chipping and caulking with sharp-edged tools. Boiler tested with hot water to 180 lbs. pressure per sq. in. Waist, 72 in. diameter at smoke-box end, made straight top, and with one dome placed centrally on waist.

Tubes of semi-steel, No. 13 wire gauge, with copper ferrules on fire-box ends, 270 in number, 2¼ in. diam. and 13 ft. 7 in. in length.

Fire-box 133 in. long and 42 in. wide inside, of homogeneous cast steel; all plates thoroughly annealed after flanging; side and back sheets 5-16 in. thick; crown sheets, ⅜ in. thick; flue sheet, ½ in. thick. Water space, 3 in. sides and back, 4 in. at front. Stay bolts, ⅞ in. diameter, screwed and riveted to sheet, and not over 4½ in. from centre to centre. Fire door opening formed by flanging and riveting together the inner and outer sheets.

Crown Bars: Crown sheets supported by crown bars each made of two pieces of wrought iron 6½ in. by ¾ in., set 1½ in. above crown, placed not over 4½ in. from centre to centre and bearing on side sheets. Crown-bar bolts not more than 4½ in. centres, screwed through crown sheet with head and washer on top, and riveted over underneath sheet. Crown stayed by braces to outside shell of boiler.

Cleaning plugs in corners of fire-box, and blow-off cock in side or back.

Balanced poppet throttle valve of cast iron, in vertical arm of dry pipe.

Grates: Water tubes and company's pattern of rocker.

Ashpan, Hopper pattern. Smoke-stack, straight style. Smoke-box extended with netting, deflector plate and spark ejector.

Main Frames.—Of best hammered iron, made in two sections, forged solid.

Front rails bolted and keyed to main frames, and with front and back lugs forged on for cylinder connections.

Pedestals protected from wear of boxes by cast-iron gibs and wedges. Pedestal caps lugged and bolted to bottom of pedestals.

Engine Truck.—Centre bearing, swiveling, two-wheeled truck, with swinging bolster and radius bar. Truck frame and aces of wrought iron, fitted with cast-iron swinging bolster. Pedestals of cast iron. Two steel-tired wheels of approved make, 30 in. diameter.

Axles of hammered iron, with journals 5 in. diameter and 10 in. long.

Springs of cast steel tempered in oil, connected by equalizing beams resting on top of boxes.

Machinery.—Cylinders of close-grained iron as hard as can be worked; each cylinder cast in one piece, with half saddle placed horizontally. Right and left hand cylinders reversible and interchangeable, accurately planed, fitted and bolted together in the most approved manner. Valve face and steam-chest seat raised above face of cylinder to allow for wear. Cylinders oiled by Nathan Manufacturing Co.'s No. 8 sight-feed lubricators placed in cab and connected to steam chest by pipes running under jacket. Pipes proved to 200 lbs. pressure. Vacuum valves in cylinder.

Pistons of cast iron, fitted with company's pattern steam packing. Piston rods of steel, ground and keyed to cross-heads, and secured to piston by a nut. Piston rod riveted over outside of nut, company's style.

Guides of steel, fitted to wrought-iron guide yoke.

Cross-heads of best cast steel, "Laird's" pattern, with babbited bearings.

Valve motion: Most approved shifting link motion graduated to cut off equally at all points of stroke. Links, sliding blocks, pins, lifting links and eccentric rod jaws made of best hammered iron well case hardened. Sliding blocks with long flanges to give increased wearing surface, rock shaft and reverse shaft of wrought-iron; valves, Richardson-Allen pattern.

Driving-wheels: Eight in number, 50 in. diam., centres of cast-iron turned to 44 in. diam.

Tires of best standard crucible cast steel, 3 in. thick when finished, front and back pairs flanged 5½ in. wide, intermediate pairs plain, 6½ in. wide.

Axles, of hammered iron; journals, 8½ in. diam., 9 in. long.

Driving boxes of cast steel, with brass bearings babbited.

Springs of cast steel tempered in oil, equalizing beams of wrought-iron, and of most approved arrangements with steel gibs and keys.

Connecting and parallel rods of hammered iron forged solid, furnished with all necessary straps, keys and brasses. Nathan Manufacturing Co.'s needle oil cups on rods and guides.

Lubrication of all bearings carefully provided for, and oil cups attached where required.

Wrist pins of steel.

Feed-water supplied by two —— injectors, No. 10 Monitor on right side and No. 10 W. F. non-lifting on left side. Injector checks of extra large size and pattern as per special drawing.

Engine to be equipped with three 2¼ in. Consolidated Locomotive safety valves. One safety valve fitted with relief lever. All safety valves fitted with steam mufflers.

Two No. 3 Ashcroft steam gauges placed one in convenient position for engineer in cab, and one at back of fire-box for fireman.

Accessories.—Cab, substantially built of clear, sound ash, well finished and fitted together with joint bolts and corner plates, to be provided with suitable windows and doors conveniently arranged and glazed with first quality double American crystal gas.

Pilot.—Of iron. Front end fitted with bumper blocks, company's standard.

Furniture.—Engine to be furnished with one sand-box, stand for head-lamp, bell, whistle, heater, blower, cab-lamp and gauge-cocks. Also, a complete set of tools, consisting of two heavy jack screws and levers, one heavy pinch bar with steel point and heel, one monkey wrench, a complete set of wrenches for all nuts and bolts on engine, one set of driving box packing tools, one packing hook, one machinist's hammer, one soft hammer, three cold chisels, two flat and one cape, one long spout quart oil can, one two-gallon oil can, one tallow pot, engineer's torch and arm rest, one extra fusible plug, one bell-cord, two cab seats, two cab seat cushions, one poker, one scraper, one slice bar, and one scoop shovel.

Head Lights.—One —— head lamp 23 in. reflector, 16½ in. deep case to be made of open-hearth steel; illuminated engine numbers inside of case; one head lamp 20 in. reflector on rear of tender.

Brakes.—American steam brakes on driving wheels and tender, La Chatalier (water) brake.

Finish.—Cylinders lagged with wood or asbestos and neatly cased with iron painted. Cylinder head covers of cast iron painted. Steam chests with cast-iron tops; bodies cased with iron painted. Dome lagged with wood, with iron finish painted casing on body, and cast-iron top and bottom rings. Hand rails of iron. Running board nosings of angle iron. Wheel cover nosings of iron. Boiler lagged with wood neatly jacketed and secured by brass bands.

ainting: Engine and tender to be handsomely painted and

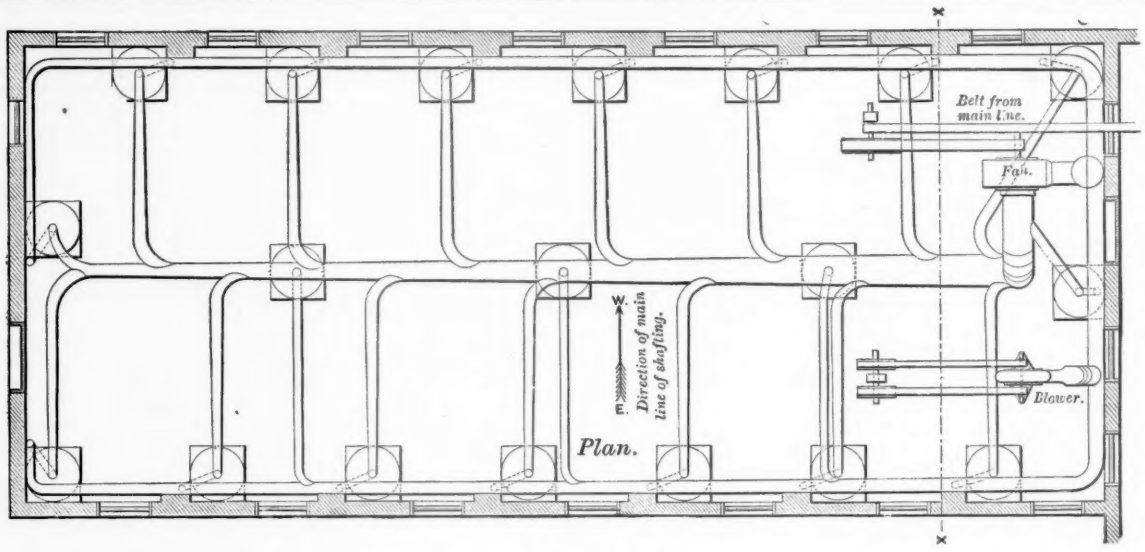
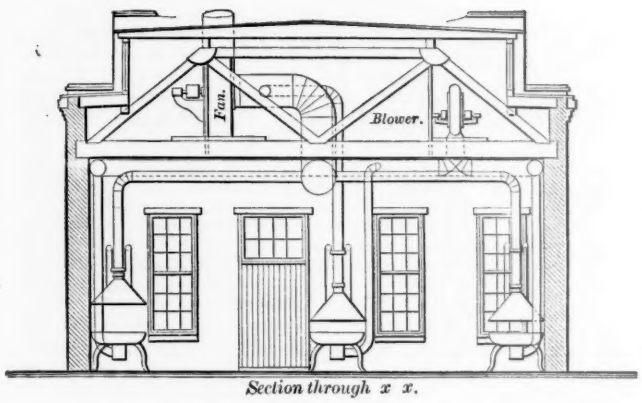
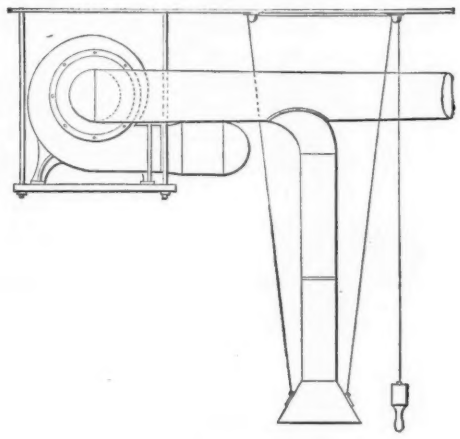


Fig. 1.



Section through x x.

Fig. 2.



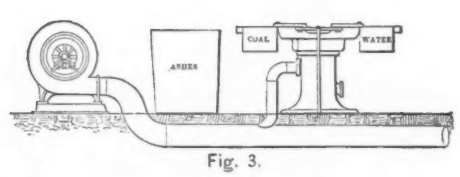


Fig. 3.

VENTILATION OF SMITH SHOPS.

By the BUFFALO FORGE CO., *Buffalo, N. Y.*

varnished; lettering and number to be as specified by purchaser.

General Features of Construction—All principal parts of engine accurately fitted to gauges and templates and thoroughly interchangeable. All finished movable nuts and all wearing sureaces of machinery made of iron case hardened. All wearing brasses made of ingot copper and tin alloyed in the proportion of five parts of the former to one of the latter. All threads on bolts to be United States Standard.

Tender.—Tank strongly put together with angle iron corners and well braced. Top, inside and bottom plates of ¼-in. iron. Outside plates of 3-16-in. iron riveted with ⅜-in. rivets, 1¼ in. pitch. Capacity, 3,600 gallons.

Tender frame substantially built of iron channel bars 8 in. deep, strongly braced.

Two four-wheel centre bearing trucks made with square wrought-iron frames and heavy equalizing bars. Additional bearings at sides of back truck. Springs of best cast steel tempered in oil. Steel-tired wheels 33 in. diameter, of approved make. Brakes on both tender trucks. Axles of best hammered iron. Outside journals 3¾ in. diameter and 7 in. long. Oil tight boxes, with brass bearings, M. C. B. standard axle (4¼ in. diam. at centre), brass and key.

Two tool boxes of hard wood, bound with iron and fitted with locks and keys.

All patent fees not covered by this specification excepted.

Ventilation of Smith Shops.

The diagrams which are given herewith show an arrangement for removing smoke and gases from smith shops, which is designed and erected by the Buffalo Forge Co. The diagrams represent a plant now in actual use.

In figs. 1 and 2 is shown in plan and cross-section a shop running 19 fires, with the system of piping by which they are supplied with blast from a power blower, and the smoke and fumes drawn off by means of an exhaust fan. Fig. 3 is an elevation of one fire in detail.

This figure shows a canopy hood suspended over the fire and provided with a counterbalance weight. It is connected with a branch pipe leading to the main flue by a telescopic joint, whereby the height of the hood above the fire may be varied at will. This feature is found to be of special convenience, particularly when starting up fires, as the hood can be lowered so as to completely inclose the fire, preventing the escape of smoke, and when fire is underway the hood may be elevated to any height suited to the work.

The designers of this system say that the proper construction of hoods and pipe connections for forge fires is not generally understood. The common impression is that the larger the hood or the more flare it has the better the results obtained. The fact is, that in no case should the extreme diameter of the hood exceed twice the diameter of the branch pipe to which it is connected; and very good results are secured by dispensing with the bell-shape hood altogether, simply carrying the branch pipe, provided it is of sufficient size, down to within 14 or 16 in. of the fire.

The blower is shown connected to a blast pipe carried underneath the floor. This arrangement is in many cases advisable, as it usually requires less piping, is out of the way, and free from danger of breakage. When the blast pipe is laid in the ground, ordinary sewer tile makes an excellent conduit for the air.

Tests of Some Muck-bar Tender Axles.

The report of tests made at the Watertown Arsenal, Senate Doc. No. 36, 49th Congress, 1st Session, contains the results of some tests which form a part of an investigation upon the effects of long continued exposure of this class of material to the ordinary conditions of railroad service.

In order to begin the investigation with material of known quality, twelve axles were forged by the Boston Forge Co. from the same lot of double rolled muck bars, and being treated alike in their manufacture are believed to be of uniform quality, within practicable limits. The axles are of the Master Car Builders' standard, having journals 3.75 in. diam., and at the middle are about 4 in. diam. They are in use in the tender trucks of express locomotives of the Boston & Albany. Mr. A. B. Underhill, Superintendent of Motive Power, contributes the axles and furnishes the track record. They are used with 33-in. wheels, and four axles carry a load of 67,600 lbs. when the tender is fully loaded with 6 tons of coal and 3,000 gallons of water. Daily trips are made from Boston to Springfield and return, thus running about 1,400 miles per week.

The axles were forged from muck bars, 3 ft. 5 in. long, 6 in. wide and ⅝ in. thick. The quality of the metal is shown by the following tensile tests of two longitudinal specimens taken side by side from the same bar.

Specimen.	Elastic limit. Lbs. per sq. in.	Tensile strength. Lbs. per sq. in.	Elongation. Per cent.	Contraction of area. Per cent.
A	26,110	46,150	17.0	21.2
B	25,930	45,420	16.5	20.8

The elongation was measured in 20 in. The fractures were fibrous, lamellar.

Between the loads of 15,000 and 25,000 lbs. per sq. in. the modulus of elasticity was 29,400,000 lbs. per sq. in.

Two new axles and one after 95,000 miles run were cut up and nine tensile specimens taken from each, three from each end and three from the middle of the length. The end specimens included the metal of the journals and a part of the metal under the wheel seats. The specimens were turned to 1.129 in. diameter of stems by 10 in. long, and had threaded ends 1½ in. diameter. They were so taken out as to retain in the specimen metal from as near the surface of the axle in each case as practicable. During the tests micrometer observations were made within and for a distance above the elastic limit of the metal, until there was considerable stretch, after which the elongations were measured to the nearest hundredth of an inch, so continuing to the time of rupture. Inch sections laid off on the stems were measured after rupture, thus determining the uniformity of the stretch apart from the local contraction at the place of rupture.

The following results are the means of three specimens from the same parts of the axle. For complete details the government report should be consulted.

AXLE.	Location of specimens.	Elastic Limit.	Tensile strength.	Elongation.	Contraction of area.
		Lbs. per sq. in.	Lbs. per sq. in.	Per cent.	Per cent.
No. 1. New axle	End 1.	21,500	46,250	22.1	31.1
	Middle.	24,670	45,980	24.5	48.4
	End 3.	19,330	46,030	25.0	41.9
No. 2. New axle	End 1.	21,830	47,440	24.2	37.9
	Middle.	25,000	46,820	25.8	49.6
	End 3.	21,670	47,280	25.7	40.5
No. 3. After 95,000 miles' run	End 1.	21,830	46,130	22.2	43.2
	Middle.	26,280	48,260	24.1	45.9
	End 3.	21,830	46,430	22.5	35.8

These tests show a very soft grade of metal. The elastic limit of the muck bar is higher than the average of the specimens from the axles, although the specimens from the middle of the length of the axles had elastic limits about the same as the bar. The higher results displayed by the metal at the middle of the axles is believed to be incident to the smaller diameter at that place, and perhaps also from differences in temperature when the axles were finished.

There is not a corresponding difference in tensile strength due to position. In only one axle is the tensile strength at the middle higher than at the ends. Neither does there seem to be any evidence of the total elongation having been influenced by the location of the specimen. The contraction of area is seen to be greater from specimens from the middle, although this may be accidental. The ductility was apparently improved by the work of forging, as shown by the greater average elongation of the metal of the axles over that of the bar.

A comparison of contraction of areas is inadmissable on account of the wide difference in the cross section dimensions of the specimens from the axles and the bar. The modulus of elasticity remained nearly the same, the average value for the axle specimens being 29,367,000 lbs. per square inch.

The results of axle No. 3 are close to those of No. 2, and not materially different from those of No. 1. Hence we fail

to recognize any change in these properties attributable to the work done by the axle in making the run of 95,000 miles.

Concerning the stresses to which these axles are subjected in service, experiments on their deflection under load showed a range of movement at the middle of the different axles from 0.0170 in. to 0.0465 in. It was thought at the time these observations were made that the minimum value was below a fair average, and that 0.0300 in. would represent the minimum deflection under ordinary conditions. The rear truck of the tender is heavier loaded than the forward one. Comparing the results thus obtained with observations at the testing machine, it appears that the metal at the middle of the axle may be strained with a fibre stress of 10,000 to nearly 15,000 lbs. per sq. in.

This completes the summary of the results thus far published. The experiments are still in progress. Some remarks of a general nature, suggested by these tests, seem to find appropriate place in connection therewith.

The principal requirement in an axle metal is taken to be strength to successfully resist the imposed stresses that are ordinarily received with such other properties as will enable it to encounter exceptional stresses without serious results. If this is the case, then qualities more or less antagonistic are required and a metal which is in a measure a compromise, as regards strength and toughness, best fulfills the requirements.

Considering at the present time transverse stresses, it will be seen that the opposite sides of the axle are equally strained by tensile and compressive stresses if the metal is homogeneous, free from internal strains and the elastic limit is not exceeded. Under these conditions, as we understand the problem, it will require a metal of equal resisting properties within the range of stresses encountered in tensile and compressive directions. And in judging of the quality of the metal suitable for this purpose we naturally look to those tests which directly supply the information. It is known that the modulus of elasticity is substantially the same for tension and compression, also that the elastic limit of some well annealed metal is about the same under each kind of stress.

This being the case, it will be understood why tensile tests are considered reliable for this class of material, or at least why tensile tests are regarded as important, whether or not other tests are made. For the tensile test would be taken to show the range of stresses over which the metal might be worked and still kept within its elastic limit. The importance of the elastic limit will be discussed later on. In a tensile test we have the opportunity of ascertaining the modulus of elasticity, the elastic limit, the behavior of the metal after passing the elastic limit. Between that time and the maximum load, which includes the total general elongation also, we learn how much the metal will contract at the place of rupture. It is true that these qualities may not be developed to the same extent in a transverse test or in the actual failure of an axle, yet a knowledge of these properties the better enables us to predict what will occur under different circumstances and certain other tests, of great importance in their way, supply but little of this information Knowing the tensile properties, it would seem a far easier task to predict what might happen under certain circumstances, than would be the task of explaining or understanding why certain results had been reached from data developed at the time, or what were the primary causes which led to the result. In fact a tensile test has the appearance of approaching the subject from the right direction.

It will be understood that in pointing out the merits of tensile tests the merits of other tests are not ignored. In the tensile test there is opportunity of observing whether the metal elongates under stresses above the elastic limit without the development of cracks on the surface of the specimen until near the maximum load, if any are developed. The metal of some axles tested so far lacked uniformity that cracks were seen forming under stresses not much above 30,000 lbs. per sq. in. These cracks form at right angles to the direction of the tension and are similar in appearance to cracks which may be seen on the surface of some hot-worked iron. Obviously, an incipient crack of very limited extent might, after a considerable number of repetitions of stresses, become of serious importance and lead to the failure of the axle. The stresses under which these cracks have been observed to form are higher than would be expected in an axle in service, but however that may be, the first weak spot in the metal would be at one of those places; and if it were located in the place of maximum stress, evidently failure would be accelerated thereby. This is deserving of attention when inspecting axles or the material from which they are to be forged.

Whenever a special degree of refinement in the selection of a metal is undertaken it generally suggests the expediency of obtaining the early history of the material; especially is this important if but few tests are to be made when accepting a comparatively large lot of axles from a small number of tests. Having a reasonably complete knowledge of the early history or working of the metal gives increased confidence in what is seen of it. In the construction of ordnance it is very properly deemed important to obtain positive knowledge of each piece, and the published records show that the metal is examined at each end of forgings of considerable length. So rigid a method of testing may appear impracticable in the case of axles. If it is so, then what is taken for granted in the quality of the metal should not be a large percentage of all that we would like to know of it.

Metal which has large elongation, or contracts well at the place of rupture, under tensile tests, is found to bend well. It is justifiable to regard this feature in the tensile test as closely indicating what is generally shown by bending tests, where the bending is done in one direction.

As regards the value of the elastic limit and its bearing upon the limit of durability of metal subjected to repeated stresses, it is rational to suppose that there is a certain range of elastic movement in iron and steel, within which repeated stresses will have no detrimental effect. The very nature of the problem is such that we can never demonstrate what is the minimum stress that will ultimately cause rupture. We can experimentally ascertain maximum but not minimum limits of stresses. We are not, however, altogether in the dark in this matter, and from various sources obtain data intimately bearing upon the subject. From these sources it certainly appears that stresses of certain magnitudes may be repeated a great number of times, and we have no data conflicting with the belief that these stresses would never produce rupture.

These may appear rather abstruse questions to introduce into a discussion of axles, and will not be dwelt upon at any great length, yet they are fundamental, and unless we can reasonably assure ourselves upon some of the points we shall be unable to say that there is no load, however small, which will not eventually end in rupture, and hence it is merely a question of time when every axle will certainly fail. A very plausible argument may be advanced on either side of such questions.

The opinion has been advanced, based apparently upon special experiments, that the limiting stress for iron, where it is practically indestructible, is not dependent upon the elastic limit. If that is true it is singularly unfortunate, for if the elastic limit is not a function of the limiting stress we have lost one of the otherwise most valuable features of a test. It is consistent with many observed facts to believe that both mechanical methods and chemical composition may improve the limiting stress of a metal, and as the elastic limit is also varied by the same means, that the elastic limit may therefore be taken as an index of its ability to indefinitely resist stresses.

We have an example in piano wire of iron in an elevated state of resistance due to both chemical and mechanical means. When wire has been exposed to stresses very largely exceeding 100,000 lbs. per sq. in., and has performed its musical functions of vibrating over a period of many years, we must attach considerable weight to this evidence, and admit that when the stresses are in one direction, as by tension in the wire, the metal possesses a very tangible limit of stress, below which it is practically indestructible, and that that limit is not a very inferior one.

If there is a certain range of molecular movement under tension possible which produces no appreciable injury, and it is further shown that under compressive stresses there is a corresponding limit, and that in each case the applied stresses do not sensibly disturb the metal from its primitive condition, then we see no reason for supposing that stresses in opposite directions may not be applied over a certain range and yet be capable of indefinite repetition. In other words, there are strong reasons for believing that transverse stresses may be applied and repeated without injury to the metal, leaving, however, the question still open as to what the maximum limit shall be. If, however, any substantial load may be applied, and not exceed this limit, then it follows that axles can be made that will not depreciate in quality or strength, and it becomes a question of proportions or dimensions when an axle is a safe one. The statement previously made concerning the elastic limit of tension and compression being substantially the same in well annealed metal, requires verification by very careful experiments to ascertain over what range of mechanical treatment this statement holds true. It will be observed that the data required to elucidate these questions are to be obtained by careful laboratory experiments.

Comparing the behavior of metals under tension and compression above their elastic limits, considerable difference exists in the amount of permanent sets which occur as the loads are increased, and under such stresses we should not expect the metal to be durable; that is, if the sets caused by the tensile stresses were not eliminated wholly and compression sets of like amounts produced by each rotation of the axle. If this were not done the neutral axis of the shaft would be constantly changing its position and a progressive failure likely to result from the train of circumstances which would follow.

Concerning rapidly applied loads, in ordinary testing it is found that stresses which are within the elastic limit cause an immediate response from the metal; no interval of time is detected between the application of the load and when its full effects are noted. The rate of application with a testing machine at best is comparatively slow; several seconds of time are required to apply a load and weigh it. Metallic strings of musical instruments furnish examples where extreme rapidity of vibration or alternation of stresses occurs. Evidence from several sources leads to the belief that elastic extension and compression may take place within a much shorter space of time than required of the metal in an axle under present speeds of railroad service.

Any transverse test of ductile material will, however, show that it requires time for higher loads to have their full effect, and unless time is allowed the deflection is less than the full amount. Now it is very certain that an axle which is so highly strained as to have a tendency to take a decided permanent set will not endure long. Tests made having reference to an overloaded axle under these high loads would seem to assimilate closely to the actual conditions of service if the loads were applied to a transverse bar or shaft and a corresponding speed of rotation given. A drop test which gives the metal an excessive deflection at each blow and causes rupture, generally with a fewer number of repetitions or reversals than an axle gets in running a mile, seems to approach but a little nearer the actual conditions of service in one direction while lacking other essential qualities. The idea of reversing the direction of the bending stresses after each blow of the ram is recognized as a good one, but one which may be adopted in other bending tests, not done with a falling weight, with equal advantage.

There is difficulty at present experienced in understanding the drop test, because so many unknown quantities enter to modify the result, and which call for separate investigation, individually. For example, it suggests inquiry into the rate of flow of the metal under different stresses; how far suddenly applied stresses are transmitted along the axle from the point of application; the effects of reversing the stresses on the density of the metal, or what seems to mean the same thing, what internal strains are introduced by these means?

Strain in iron and steel beyond the elastic limit has been found to cause a reduction in the modulus of elasticity, from which there is recovery after a period of rest. The full significance of this remarkable phenomenon has perhaps not been reached. Opportunity for investigating what treatment accelerates or retards the recovery of this value has not yet offered. Until further experimental data have been developed, it would be idle to speculate whether rapidly applied stresses would or would not retard the tendency to recover.

Internal strains may exist in the metal and be a source of weakness. There appears to be no way of ascertaining the extent of internal strains except by releasing them and noting the changes in dimensions of the specimen, and the act of releasing the strains would, in most cases, destroy the material for its intended purpose. To form an adequate opinion of the strains which may be present in a piece of metal without practically destroying it, it is essential to be familiar with the history of its manufacture, and judge of its condition by comparison with other material similarly treated, and which has had experiments performed upon it. Internal strains may exist equal to the elastic limit, and as the treatment which results in the introduction of internal strains has also a tendency in some cases to elevate that limit it is possible to have internal strains somewhat exceeding the mean elastic limit.

The internal strains located near the forged surfaces are very likely to be those of compression. It is hardly safe, however, to assume that the condition of the axle is improved by reason of the strains being in compression, or even that its condition is equally good, as when free from strains. Although failure may ultimately be reached in a tensile direction, we do not know that it may not be accelerated by the elastic limit having been repeatedly exceeded on the compression side of the axle. Experiments of a highly refined nature are required to answer questions of this kind. One-eighth of an inch of metal on a side turned off in finishing the journal releases most of the internal strains due to the process of manufacture in that locality.

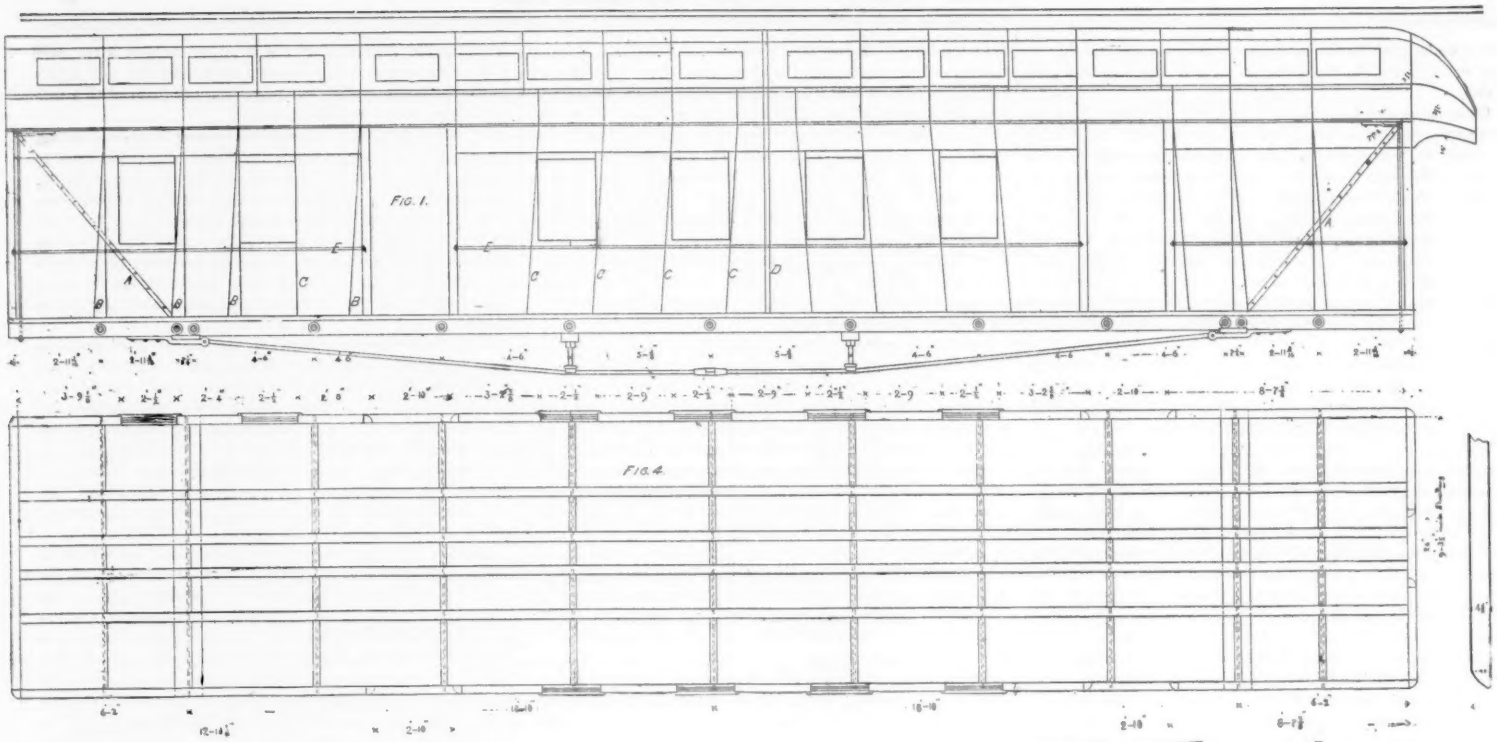
A prolific source of difficulty and danger comes from heated journals. That a very high temperature is sometimes reached there can be little doubt, and while at this temperature injury may result from straining the metal beyond its elastic limit, while it is possible that injury may result from other causes in addition to the direct effects of loading beyond the elastic limit, yet it is thought that the principal injury when heated comes from that cause. The brittleness frequently displayed at a blue heat under excessive bending might be expected to manifest itself under similar conditions in an axle. It can be readily seen that an axle might be bent while in a weakened state at a high temperature or even incipient cracks formed that would ultimately lead to complete rupture. If a journal is bent out of line with the wheel-seat every rotation may bring undue stress on the metal. The condition of an overheated journal may well be regarded with solicitude, at least until further experience has been gained on the subject of straining metals at different temperatures.

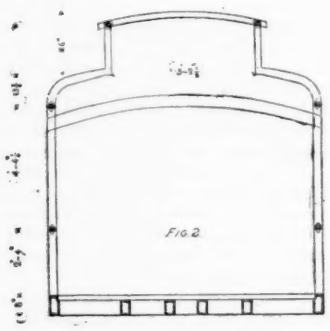
Tests of iron which has been long exposed to moderate stresses have not revealed a crystalline structure. All old material has not been found tough and fibrous, although much of it has. Some has fractured with a granular appearance and possessed slight ductility. This latter class of fractures has been traced in some instances to the process of manufacture which, in new iron, gives brittleness. Over straining with loads approaching the tensile strength followed by a period of rest has produced brittleness of a most decided nature, which has been eliminated by annealing, and the original tensile properties in a great measure restored.

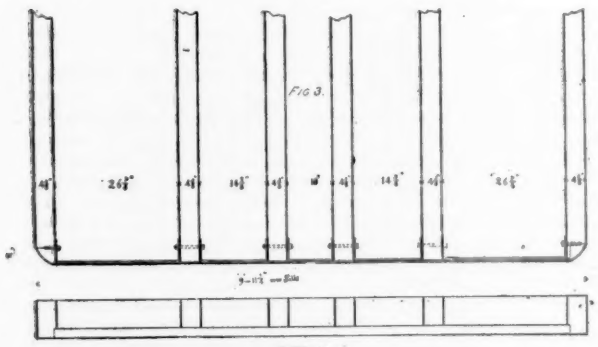
If it is largely a question of elastic limit what stress may be carried for an indefinite period and number of repetitions of stresses, then it would follow that iron would hardly be a formidable competitor with steel on account of the great range in elasticity possible in the latter metal. It is believed that steel is capable of sustaining the advantage due its higher elastic limit, if exceptional stresses never exceeded that limit, either from external stresses alone or the same aided by internal strains. The well known tendency of incipient cracks to extend rapidly, at times with extreme rapidity, and end in complete rupture, is against the employment of the higher grades of steel. A mild or medium hard steel is used in steel axles of present manufacture.

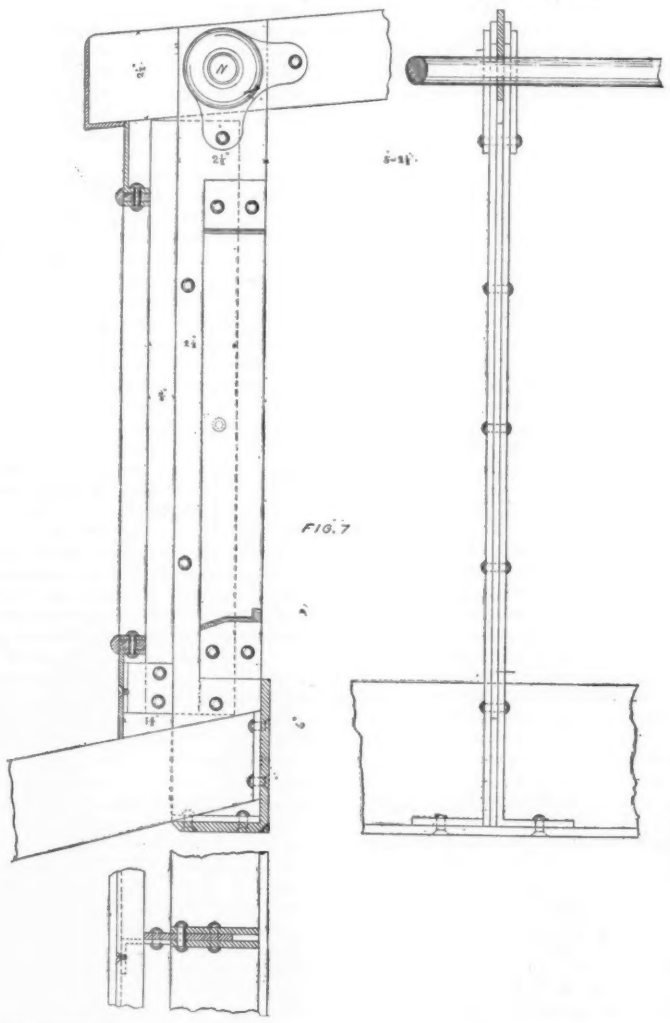
The fibrous structure of iron axles in which the metal has little lateral cohesion supplies conditions favorable for the safety of the metal in this respect that incipient cracks are prevented extending so rapidly as in steel. This feature of fibrous iron is valuable under circumstances wherein there is considerable variation of load from time to time. Under a constant stress it is obvious that rupture would soon be completed if the stresses were sufficient to begin to destroy the most strained fibres.

A bar under direct tension is weakened, as a whole, by the









THE AMERICAN FIRE-PROOF STEEL CAR.

presence of a crack beyond the proportion of the section actually ruptured, not because of any loss of cohesion of the metal beyond the crack, but on account of the concentration of stress at that place due to its inability to elongate. If the metal has a very loose structure, and its strength varies in different directions, although the crack becomes of comparatively less moment than under other circumstances, still its presence is undesirable.

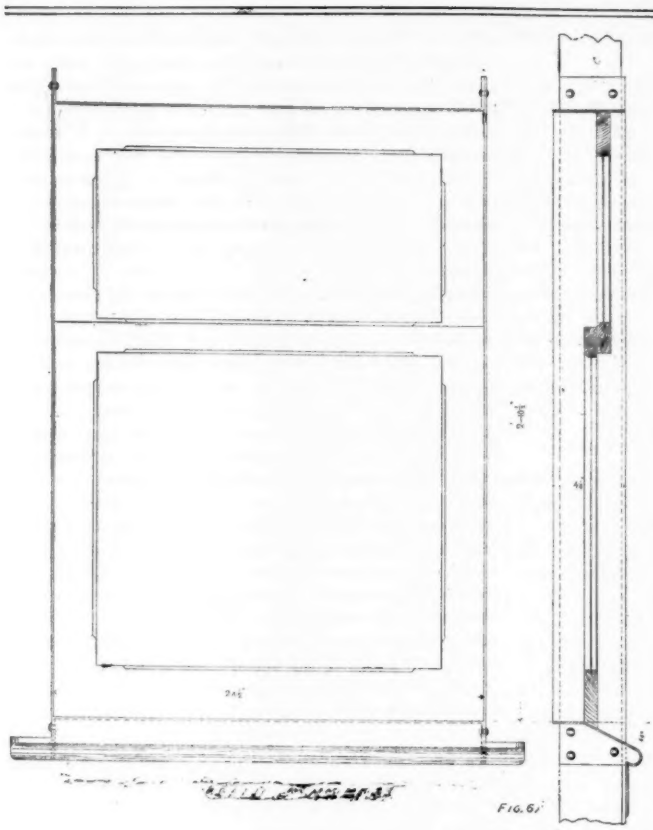
The accurate determination of the stresses received by axles in service is of the greatest importance, but in practice most difficult.

The tendency to increase the capacity of freight cars whereby the load per axle will equal or exceed the weight carried by the muck bar axles referred to in the above tests adds emphasis to the remarks about the necessity of ascertaining the maximum stresses received by them in service. Changes made that involve increased weights or modifications in the details of the boxes whereby increased leverage results, all going to create higher stresses, certainly require careful investigation. Past experience in changing the dimensions of different parts while arriving at the present standard is often referred to as illustrating how changes made for the purpose of securing additional strength in one direction often resulted in the introduction of new difficulties in other directions. Perhaps it is not claiming too much for laboratory tests to say that it seems to be the province of such tests, enlightened by a knowledge of the stresses in service, to abbreviate the length of time required to ascertain whether an improvement in one direction is likely to result in injury in another.

The inspection of material in service is, of course, carried on for the purpose of detecting any perceptible change indicative of depreciation in quality, or the formation of incipient stages of rupture. Such inspection has generally been limited to the detection of early cracks in the metal, and it will be admitted that except in the laboratory it is difficult to accomplish much more. Even there few experiments have been made which indicate clearly what constitutes deterioration. If the inspection relates almost exclusively to the detection of incipient cracks how important does it then become to make the inspection as thorough as possible. Furthermore, it practically becomes a necessity to use such material as will give some premonitory symptoms of injury. Otherwise the inspection is in vain, and rupture may be expected at any time so far as the inspection is concerned.

If the stresses were constant there would be far less opportunity of detecting an incipient crack than is believed to be the present opportunity. Years have elapsed since the progressive rupture of axles by the gradual development of fine cracks has been a well recognized fact, but knowledge of the length of time they are in developing to a dangerous extent does not yet appear to have been gained. The more or less superficial inspection accorded most axles precludes the acquirement of even an approximate idea of the length of time they exist. The most favorable opportunity to carefully inspect the metal is found at the journal. It is readily accessible. The polished surface exposed gives excellent metal on which to detect a fine crack, and if axles were so proportioned as to locate fracture at the journal and, beyond peradventure, nowhere else there would be reason for taking a very hopeful view that unexpected failures would seldom happen.

When a crack has opened a width of a thousandth of an inch it may be readily seen with a single lens reading glass of comparatively low power. Low magnifying power is preferable to high in this class of work. The difficulties in focusing, the limited field, the exaggerated appearance of surface scratches and the difficulty of distinguishing them



AMERICAN FIRE-PROOF STEEL CAR.

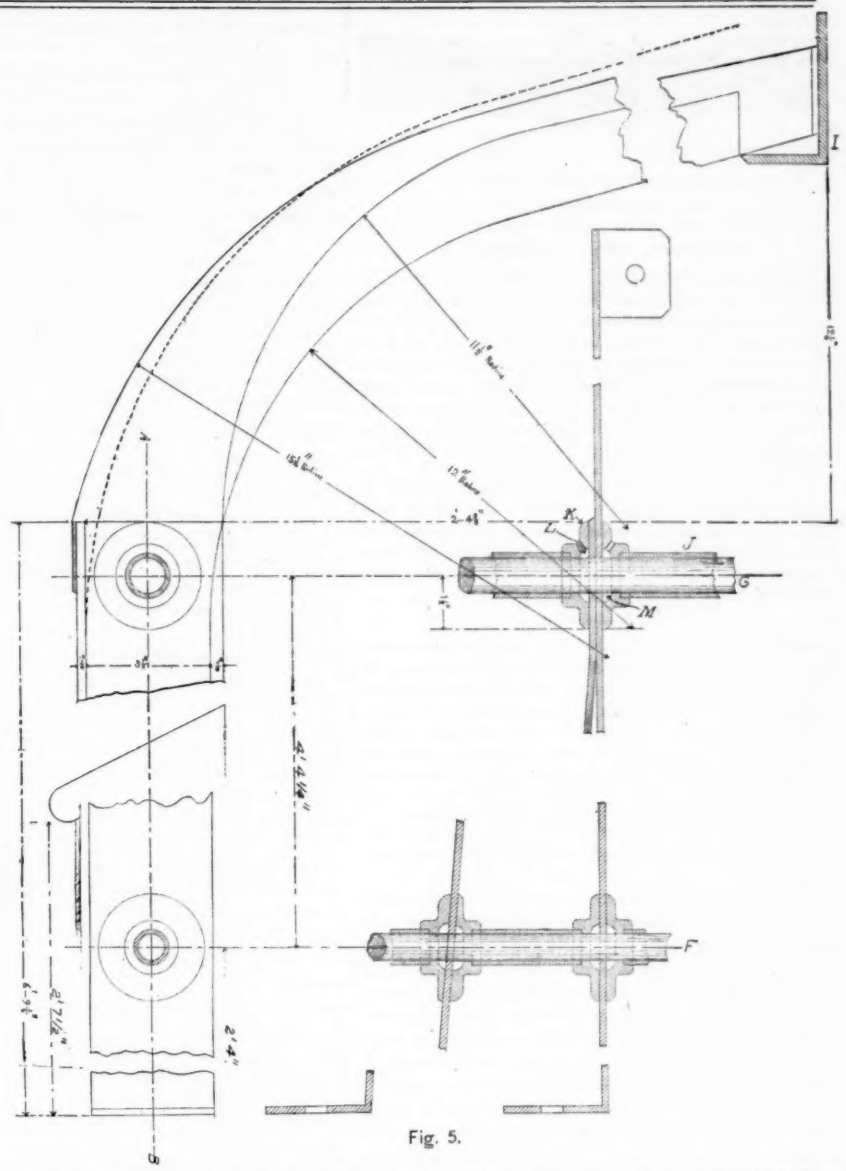


Fig. 5.

from rupture of the metal all tend to the preferment of low magnifying powers for practical application, although in the laboratory these objections would have much less force.

Inspecting the axle to ascertain whether the journals are appreciably bent, by rotating it on centres, would indicate if excessive stresses had been received, and if they were found out of line prudence would demand immediate removal from service. On the other hand, it is not certain because an axle does not run out of line that the metal has not reached a condition which requires its removal.

It does not seem as though it would be an onerous task to rigorously examine the journals of axles at stated periods, or to provide good centres and examine the alignment of the journals occasionally. Whenever exceptional loads have been carried or overheating has occurred, or if the wheels have been off the rails, the facts should be noted and the axles thus exposed might be given increased attention.

JAMES E. HOWARD,
Dec. 28, 1888. Watertown Arsenal, Mass.

The American Fire-Proof Postal Car.

The illustrations herewith show a new form of metal car designed to furnish a strong and fire-proof construction for both passenger and freight equipment. The first car of this design was constructed at the Louisville, New Albany & Chicago car shops at New Albany under the supervision of Mr. Chas. Coller, Master Car-Builder of that line, for the American Fire-proof Steel Car Co., of Chicago, and was lately delivered in Chicago.

This car is built of steel, asbestos, iron pipe and wood. The framing is constructed as follows: The longitudinal sills are oak, with steel plates on both sides. The end plates are steel with wood facing. The posts are made of flat steel strips about 3½ in. by $\frac{3}{16}$ in., bent edgewise while cold, to conform to the cross-section of the car, in a machine especially constructed for that purpose, in such a manner as to be free from buckles on the inner edge. In some places these posts are made double, in other places single. These posts are fastened to the side sills by bolts passing through feet turned up on the posts. These posts are in one piece with the carlines.

The monitor framing, also made of steel, bent edgewise, is riveted to an angle iron at the joint between the carlines and the monitor. This angle iron runs the whole length of the car, and to it the monitor frame and side posts are attached. The spacing of these posts is accomplished by means of long bolts and spacers made of gas pipe, as shown in the drawing.

The plates on the exterior of the car are corrugated to resemble battens, such as are often used on wooden cars Between these exterior plates and the posts is placed a sheet of asbestos about ¼ in. thick. The interior plates are without corrugations, and are lined with asbestos in the same manner as the exterior plates. The floor is covered with perforated metal, having minute projections upward to prevent slipping. The ceiling of the car is formed of thin metal fastened to the carlines.

The details of construction are shown in the illustrations. Fig. 1 shows the framing and trussing. No attempt is made, in this design, to carry any portion of the load upon the floor by means of the superstructure of the car. The whole load is carried by the truss rods beneath the car. Counter braces shown at *AA* are inserted to prevent longitudinal movement of the superstructure in case of collisions and severe buffing strains. The double posts are shown at *B* and the single ones at *C*. At *D* is shown a post which is made of wood, lined on both sides with steel plates. The posts at *C* are inclined with the intention of obtaining additional stiffness. At *E* are shown the rods which carry the thimbles which act as spacers, shown in detail in fig. 5 at *F* and *G*. Fig. 2 is a cross section of the car, showing the shape of the posts, carlines and monitor framing. The piece shown at *H* is not used except for the blank end of postal cars. Fig. 3 shows the covering on the sides of the floor sills. Fig. 4 is the general plan of the car showing general arrangement of the sills. Fig. 5 shows a complete post bent to shape. At *I* is shown the angle iron forming the joint between the carlines and the monitor framing. The long bolt *G*, shown in this figure, passes from end to end of the car, and is tightened by nuts on both ends. The pipe spacers *J* enter cast iron washers *K*. After these spacers are all in position and drawn up tight, melted zinc is poured into the holes *L* in the washers, thus filling the spaces *M* in such a manner as to prevent any movement of the spacers, washers or bolts. Thus, any possible rattling is prevented in case the nuts on the bolts become loose, and it is stated that the adhesion of the zinc to the rod *G* is sufficient to prevent any longitudinal motion of the posts, even if a section of the bolt was wholly removed.

Fig. 6 shows the arrangement of the window frames and sills. Fig. 7 shows a section of the monitor and the manner of attaching the monitor framing to the carlines. At *N* is a rod extending from end to end of the monitor, with spacers and washers the same as between the posts.

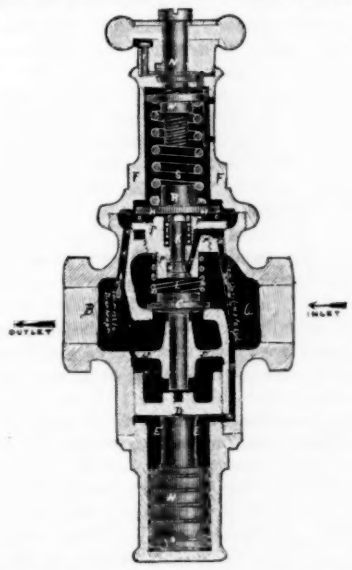
The steps of the car are very light, being made of ¼ in. steel plate.

This car, as now constructed, weighs, it is stated, about the same as an ordinary wooden car for the same service. It is claimed, however, that experience acquired in building this car will enable the constructors to reduce the weight of those to be built hereafter several thousand pounds. A number of changes are contemplated in cars built on these general plans in the future, one of which is the substitution of a composite post, instead of the double and single ones here shown. This post is to be made of two pieces of 3½ by $\frac{3}{16}$ in. steel, similar to those shown in the illustrations, placed ⅞ in. apart and filled in with seasoned beech. These posts will run vertically instead of obliquely, as shown in the illustration. The object of this change is to simplify the attachment of the interior and exterior plates of the car. Mr. Coller states that cars of this construction can be built with about the same labor as the ordinary passenger coaches, and that there are no particular difficulties to be met with in this design.

The advantages claimed for this design of car are that it is re proof, as far as the demands of railroad service require, and that in collision it will bend, but not splinter. It is also further claimed that cars made in this manner will have a much longer life than those made of wood. The exact dimensions of this car and many interesting details of construction can be obtained from the illustrations.

Improved Mason Reducing Valve for Car Heating.

The accompanying sectional view of the Mason reducing valve illustrates a new self-locking device in connection with the handle whereby it is rendered impossible for the jar of the locomotive to affect the pressure. It is not necessary to adjust any nuts or rings by means of a wrench for minimum high or low pressure, for it will be noticed that in the upper part of the spring case is a small pin of steel, which is forced by a spring into any one of twelve indentations, which are placed near the circumference of a hardened steel plate.



The handle by which the pressure is changed may thus be turned in any direction and remain securely locked. The handle is turned in the same direction to shut off the pressure as is the handle of an ordinary globe valve.

Another feature of this valve is the dash-pot attached to the bottom of the main valve, whereby sudden fluctuation of pressure is avoided, and the action of the valve is made noiseless. It is made by the Mason Regulator Co., Boston.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The enormous railroad building of 1887 must naturally have been followed by large additions to equipment. The year 1888 was one of reduced net earnings and heavy expenses, nevertheless the output of locomotives was probably greater than in any preceding year except 1882, and the output of cars has been very close to that of 1887, if not greater, and probably greater than in any other one year. Last January we published the number of locomotives built yearly by 19 private firms from 1880 to 1887 inclusive. No attempt was made to get the number built by the railroads. The greatest number of locomotives built by these 19 firms was 2,282, in 1882. In 1887 they built 2,044. In 1888 17 firms built 2,180 locomotives, and 66 railroad companies in the United States and Canada built 382. This is undoubtedly very near the whole year's output. The 17 firms of locomotive builders include all of the large builders, and all whose product has been important. Replies were recived from 108 railroads, and the 66 which built locomotives include all of the larger companies, and nearly all which build any locomotives. The average annual output of the 19 firms from 1880 to 1887 was 1,645 locomotives, and the least number built was 800, in 1885. Of the 17 firms only one built over 700 locomotives. The next largest product of one firm was 301. There were three firms which built over 200 locomotives each, and seven building over 100. Besides the locomotives, there were 17 Rotary snow plows built.

The cars for freight service built in 1888 were, by 37 firms, 62,280, and by 66 railroads 19,910, or 82,190 in all. It is impossible to say what percentage of the output of the year these figures represent, but it must be a very large part of the whole. In 1887 the cars built to run in freight service were, by 15 car works, 23,775, and by 29 railroads 6,426, or 30,201 in all. It is seen that the number of cars built increased in 1888 in greater ratio than the number of companies reporting, which in itself would indicate that the output has actually increased. On the other hand, those car-builders who reported in both years almost without exception built somewhat *more* cars in 1887 than in 1888, the net result for the 15 firms being a decrease of about six per cent. in the latter year. This is the closest approximation that our returns will enable us to make to the relative activity of the freight car business of the two years. Among the 21 car works reporting for 1888 who did not report for 1887 are 10 which built over 1,000 cars each, five which built over 2,000 cars each, and three which built over 3,000 each. These 10 large producers were enough to raise the average so as to account for the fact that while the number of cars built has increased more than the number of car works reporting, the individual works reporting in both years show an actual, but slight, diminution of activity. Of the 36 car works, one built over 5,000 cars for freight service, four built over 4,000 each, 10 built over 3,000 each, 12 built over 2,000 each, and 20 over 1,000

The same car works and railroads report cars built to run in passenger service as follows: By 36 car works, 1,954; by 66 railroads, 517; total, 2,471. In 1887 15 car works built 561 cars for passenger service, and 29 railroads built 169, or 730 in all. In every case where one car company has reported for both years the product of 1888 is considerably increased over 1887, and it is a fair presumption that the passenger car business was generally more active in 1888. There were four works that built over 300 passenger train cars each. On the whole, in spite of the great falling off in railroad construction, and notwithstanding the decrease in net earnings, the year 1888 was one of the three years of greatest output of rolling stock, and the amount turned out was nearly if not quite equal to that produced in 1887 or in 1882.

There is a movement on foot to put on some of the suburban railroads in the vicinity of Chicago, locomotives equipped to burn petroleum as fuel. A prominent road in that vicinity has taken the matter under advisement and will equip a specially designed locomotive with oil fuel burning apparatus. The expectation is to burn Lima oil, which is now delivered to Chicago by a pipe line from the Lima coal fields. This oil is now in use in the Chicago Rolling Mills. It is possible, by the use of petroleum, to remove the smoke nuisance so disagreeable on suburban trains, and this is probably the first consideration with those who are about to undertake this experiment. Many of our readers will remember the very complete account which we gave July 1, 1887, of the careful trial of petroleum firing on the Pennsylvania. The result there was mechanically most satisfactory. The ease of manipulation, the precision with which just the right amount of fuel could be burned, and the absence of smoke and cinders, all combine to make it "ideal firing." The only question is one of economy, and when it is understood that the Pennsylvania Railroad alone burns in its locomotives fuel equal to one-third of the total oil production of the United States, it is at once apparent that any general use of petroleum fuel for locomotives is out of the question. There are localities and conditions, however, in which it may be advantageous to use petroleum, and perhaps the suburban passenger service of Chicago offers such conditions. If it is successfully used in and about Chicago, the practice may extend to other Western cities which suffer from soft coal smoke, and knowing well the competent hands into which the Chicago trial has fallen, we think there is good reason to expect its success.

In the last issue of the *Railroad Gazette* was printed a paper read by Mr. Herbert Hackney, before the the Western Railway Club, giving an account of the circulator devised by him and put in use on the Atchison, Topeka & Santa Fe and other roads. The objects sought in applying this device to locomotive boilers are to secure better circulation, to remove matter in suspension, and to extract, as far as practicable, the scale-producing impurities. Mr. Hackney's apparatus, judging from the reports, has been quite successful thus far. It operates upon well-known principles. The production of rapid circulation is accomplished by connecting the lower and colder water in the boiler with the higher and warmer water by means of tubes which are heated on the exterior by the flames of the furnace, thus causing a rapid upward movement of the cold water as the warmed water rises through the tubes. To what extent this is accomplished can be seen from the statement that the water at the fire-box ring was about as warm as that at the top of the boiler when the circulator was in use, while in those engines having no circulator there was 150 degrees difference between the temperature at tbe top and bottom of the fire-box. The removal of the matter in suspension is accomplished by the use of a large 6-in. pipe as a mud drum placed above the flues, with a blow-off cock, in a manner similar to that in use in the "Heine" boiler. Scale producing impurities are removed by allowing the water to become quiescent after being heated, the heat driving off the carbonic acid gas which was acting as a solvent for such impurities, the removal of this solvent allowing the impurities to settle in the quiescent portion of the large tube, while the rapid circulation produced by the circulating pipes prevents a deposit of such impurities in other portions of the boiler. This is the first instance which has come to our knowledge, where these principles of feed-water purification and circulation have been simultaneously applied to a locomotive boiler. Mr. Hackney deserves credit for the ingenuity displayed in originating this combination, and the clear manner in which he describes the action of circulation and heat conduction in locomotive boilers renders his paper of value to all who are interested in such subjects. As to the purification of feed water for locomotive use, there are two widely differing opinions among Western railroad men; one strongly in favor of removing deleterious matter from the water before it is fed to the boiler, by means of stationary purifiers at the various water tanks; the other favors purifying the feed water after it is fed to the boiler, or else counteracting its disastrous effects by means of antidotes and scale-removing compounds inserted from time to time into the shell of the boiler. The argument against the stationary water purifiers is their cost, while against the purification of water within the boiler there is the objection of complication, in the case of the purifier, and of ineffectiveness on the part of the antidotes and cleaning compounds. The addition of the duty of the circulating pipes to the double purpose, mentioned above, of removal of sediment and extraction of scale-producing compounds, gives to the device designed by Mr. Hackney a triple function, the advantage of which, as shown thus far by practical trials, will tend to a considerable degree to offset its complications and expense. There is need on all Western roads for an efficient water purifier, whether stationary at the water tanks, or suitable for use in a locomotive boiler, and there is no better field than this for the ingenuity of chemists. The monetary results will be large and direct.

In the last number of *The Age of Steel* we find seventeen answers to an inquiry among iron men as to the effects of the Inter-state Commerce act. These may be classified as follows:

Regard the act as beneficial	3
No decided opinion	3
Favor moderate changes	4
" radical "	4
" entire repeal	3

The significance of this result comes from the character of the men themselves. If railroad men had expressed themselves in this way there would have been no occasion for comment; but when the expression comes from shippers instead of carriers, it shows that the reaction against the law is affecting wider circles. One writer says that, as far as he has observed, the strongest advocates of the law are those who use the railroads least. Another (Mr. H. A. Crawford, of St. Louis) treats the pooling question at some length, and with great good sense. While admitting that a pool often tempts people to put rates unduly high, he thinks that the railroads have learned the lesson that such high rates produce a reaction which is disastrous. He, therefore, apprehends no danger of extortionate rates from railroad pools, but rather a stability of general business which is not likely to exist without them. Other firms give their assent to the same general views. Of course, the iron trade is, in one sense, not wholly independent of railroad influence, for the railroads are the iron men's best customers, and any depression in railroads is sure to react upon the demand for iron. At the same time, the answers are most valuable as showing the drift of public sentiment in certain quarters.

The superintendent, or his lieutenant the trainmaster, has a constant duty of seeing that the road's employés, on trains and elsewhere, perform their full duty, and make economical use of their time. Time of trains must not be wasted on the road either by fault of the management or carelessness or laziness of the men. Too large a number of crews must not be kept on the lists, for in case of disarrangement of trains, as in storms, etc., superfluous trainmen may be a source of expense. This is a duty which is very well understood. But there is another duty, and one perhaps of equal consequence, in a direction exactly opposite. It is important that men shall not work too much. Besides seeing that they do not waste the company's money by being on the road too long, the officer in charge ought to know that they are not on the road too many hours for *any* purpose, even for the laudable one of increasing their pay, or when apparently helping the road by working extra when there is a rush of freight. To have too few crews is as bad as to have too many, and there should always be enough so that train masters and yard masters will have no temptation to scrimp the men's sleeping hours for the sake of clearing the yard.

One superintendent found his worst perplexity, during a recent rush of freight, in the importunity of his trainmen to be permitted to make a large number of trips per week. Christmas was approaching, and extra money in one's pocket would give a larger quantity of solid satisfaction than 'most anything else imaginable. Men who had been out on a very long trip would, in asking to be at once sent out again,

convince themselves (if not the yardmaster) that they were feeling as fresh as though they had just enjoyed a full night's rest at a White Mountain hotel in June. In the intense pursuit of the extra dollars, the risks run in "pounding their ear" while on the road were lost sight of, and if the caboose cushions were numerous enough no doubt two or three at a time often recuperated themselves in this frugal manner. Under such circumstances as these the futility of legal enactments which aim to insure six, nine or any other number of hours' sleep off duty is at once apparent.

But the importance of having men "fresh, rested and vigorous," when they start out on a trip is as real, practically, as is the recognition of the principle, theoretically, among superintendents when *talking* about train management. Whatever the difficulties or obstacles in the way, all officers having to do with this branch of the service should be constantly impressed with the true importance of this point. Brakemen should be prepared for conductors well in advance of the time when they will probably be needed. The ability to provide a number of extra crews at short notice should be a point for yard masters to take pride in. Notwithstanding the indefiniteness of the arguments and the inability to reach any conclusive decision regarding the influence of sleepiness on men's behavior on such occasions as Mud Run and a dozen others that could be named, the certainty that the influence exists, and the strong likelihood that its effect is measurable, still remain, and all legitimate means should be taken to guard against it. The broad principle that anything which tends to unfit a man for duty is a fair subject for inquiry by an employer should be constantly kept in mind, and should not be disguised in dealing with men. The question of Sunday work is included in this. Where men have to work on Sunday there need be no moral point involved in their resting on Monday or some other week day. It is as much for the company's interest as for the man's that he have adequate rest; and if he is disinclined to take it, it is fair for the superintendent to step in and aid him to a right decision. Whatever the question of practicability in all this matter, there can be no question as to its right and desirability.

Thick or Thin Tires.

The statistics showing the comparative wearing qualities of 3-in. and 4-in. tires given by Mr. Godfrey W. Rhodes, Superintendent of Motive Power of the Chicago, Burlington & Quincy, before the Western Railway Club, are the most complete of any yet produced; but Mr. Rhodes' conclusion, that the 3-in. are superior to the 4-in. tires, although, perhaps, appearing on the face of the data, is hardly warranted by the facts in the case. We are not yet justified in saying that one thickness of tire has from 25 per cent. to 62 per cent. greater wearing qualities than another when the difference between the mileage of identical tires per $\frac{1}{16}$ in. of diameter, upon which these conclusions are based, varies over 200 per cent. with the same brand of tire on the same class of engine and in what is supposed to be the same service.

This question of the comparative value in service of thick or thin tires, is one of great interest both to railroad officers and to tire makers. With equal wearing qualities per unit of thickness the 4-inch tire is much the cheaper tire to purchase. If, however, the 3-in. tire has so much more wear in each unit of thickness that it is the cheaper tire, it is important to know it. It has been claimed that the interior of a 4-inch tire is less dense than the interior of a 3-inch tire. This, however, has not as yet been shown to be the case, and the attempt to discover the comparative density made at the Watertown Arsenal, several years since, resulted in failure on account of the unsatisfactory method of experiment; the results obtained then indicated, perhaps, toughness rather than density. It has not yet been proved whether density is the single desirable quality in a tire. Many engineers are still of the opinion that hardness and toughness are the desirable qualities; these qualities being in noway directly indicated by the density.

If the interior of a tire is softer than the exterior, or, rather, if the interior is much less durable than the exterior, it should show in the results of wear, which is not the case uniformly in any of the data thus far obtained. In many cases the interior of the tire has given several times as much mileage per sixteenth as the exterior. This is true as well of the 4-in. as of the 3-in. tires.

A driving tire wears by rolling and sliding contact with the rail. Which of these contacts causes the greater wear is, as yet, undetermined, and it is impossible to satisfactorily compare the durability of tires except on the basis of both abrasion by rolling contact, and abrasion by rubbing contact. Mileage alone takes into account the rolling contact only. To include the sliding contact the number of stops, the weight of the train, the season of the year and the watchfulness of the engineer must be considered, and in addition some notice must be taken of the cylinder power as compared with the weight available for adhesion. The wear, resulting from the rolling contact, will be greater with a heavy than with a light engine, while the wear resulting from sliding contact will, in general, be greater with the lighter engine.

Taking into consideration all of these objections to conclusions from data thus far obtained, there would seem to be but one way in which to obtain satisfactory light upon this subject, and that is to place 4-in. tires upon one side and 3-in. tires upon the other side of the same engine. In this way, and in this way alone, can really comparable results be obtained.

The regulation of the operation of locomotive engines upon the Chicago, Burlington & Quincy is as complete and as strict as upon any other road in the country. Much attention has been paid there to the question of the sliding of driving wheels, and yet, in the face of all this, the returns of tire mileage show a variation per sixteenth of diameter from 5,000 to 18,000 miles with the same engine, the same tires and in the same class of service; the lesser mileage being derived from the exterior of the tire, and the greater from the interior, or what is claimed to be the less dense portion of the thickness. If the great care exercised on the Chicago, Burlington & Quincy results in no greater uniformity of wear, what must be the variation on lines where but little care is taken to reduce tire wear to a minimum? In view of all this it would seem that the question of the thickness of tires fades into insignificance when compared to the more vital question of the reduction of tire wear, of the same brand and in identical service, to a reasonable uniformity and a minimum amount.

The Control of Railroad Rates.

There are two kinds of rate cutting, secret and open. Secret rate cutting takes the form of special contracts, underbilling or division of agent's commissions. In open rate cutting, the published tariffs themselves are reduced by competing lines to a point where they cease to be remunerative.

The public is apt to confuse the two. This is not to be wondered at, for there is a certain connection between them. Secret rate-cutting, if carried on to a great extent, is almost certain to lead to open war of tariffs. Such has recently been the case in many parts of the country. But it does not follow that if you prohibit open wars you will thereby stop secret reductions. Such a policy may have precisely the opposite effect from what is intended. It may increase the inducement to secret rate cutting rather than diminish it. If published rates are low, the margin of profit on competitive business is so slight as to leave little inducement to extend it. If published rates are raised, without adequate provision for their enforcement, the inducements to make special rates are vastly increased.

Many of the proposals for reform lay too much stress on the nominal rates, and too little on the provisions for their enforcement. The suggestion that the rate-making power should be taken out of the hands of administrative officials, and put within the immediate control of the board of directors, seems to us open to this criticism. It would make the whole system so rigid as to increase the pressure against it, both from within and without. It would thus make it vastly more difficult to prevent individual cases of favoritism. If some roads adhered to it strictly while others did not, the former would lose business which the latter would gain. Nor do we believe that the Inter-state Commerce law could be made an efficient means of avoiding this result. We have noticed with interest Mr. Stickney's proposed attempt in that direction. We hope that he will be heartily supported in his efforts. But it is not because we think that he will succeed in his immediate purpose. It is because an effort of this kind, made in good faith, is the best way to test the question whether the law is an adequate instrument for the work which it undertakes to perform. If Mr. Stickney is earnestly supported, so that there is no doubt about the good faith of the railroad men who are acting with him, his experiment will be of great positive use, whether it prove a success or a failure. If the law be defective the surest way to have it improved is to make an honest effort to enforce it.

When the Inter-state Commerce law was first passed most railroad men predicted that the prohibition of pools would do more to interfere with the main purpose of the act than any of its pains and penalties could possibly accomplish. For the time being, it seemed as if these predictions were going to prove erroneous. When the act first went into effect, there was a remarkably successful effort to abolish special rates distinct from the published tariff. Of course there were exceptions. False billing was quite common, and division of commissions not infrequent. But taking the railroads of the country as a whole, it is pretty certain that a larger proportion of their business was done at published rates in the latter part of 1887 than had been the case for many years previous.

During this time the short-haul clause was not at all rigidly enforced. Under the free construction of the Louisville & Nashville opinion, the Southern and Transcontinental lines held themselves absolved from the necessity of conforming to it; while the trunk lines virtually evaded its more radical effects by their system of car-load rates.

It is idle to speculate as to the chance that this state of things might have continued. It is impossible to say how far the effort of the Commissioners to draw the lines more closely on the short-haul clause is responsible for the growth of personal discrimination within the last few months. It was not by any means the only cause which operated in that direction. But it is a noticeable fact that during those months when the tariffs were brought more and more into outward conformity with the short-haul principle, violation of those tariffs was on the increase. While the Commission was assuming wider and wider jurisdiction over questions of local discrimination, the more important matter of secret personal discrimination was passing out of its control. The Commission appears to have shared to some extent the error of the public in looking too much to nominal requirements and too little to the means of enforcing them. The influence of its earlier decisions had been so great and so well deserved that it was, perhaps, led to suppose that it needed only to utter a principle in order to have it generally obeyed. But the authority of the Commission, however great, was a precarious one. It was impaired by the adverse turn of business which made the railroads less prosperous. It was weakened by the attempt to do away with all exceptions to the short-haul clause. It was endangered most of all, perhaps, by the almost explicit refusal of the Commission to assume the power to protect the railroads against the injurious consequences of the act.

For a long time the Commission seems to have had no idea of the way things were going. The Second Annual Report, while recognizing some of the present evils, implies a doubt as to the existence of widespread evasion or disobedience. But the visit of two of the Commissioners to the chief seat of war opened their eyes to the facts in the case; and the subsequent utterances of Mr. Adams and others have given the public a full if not an exaggerated idea of the extent of the evils.

There may be some doubt whether the Inter-state Commerce law was the cause of these results. That it has failed to prevent or control them there can be no doubt whatever. What would be the result of a more stringent effort on the part of the railroads to secure obedience to the act remains to be seen. The effort ought to be made; first, because the law demands it, and second, because the public demands it. The public at present believes that railroad men as a body are to blame for this state of things. If the railroads assume anything like a defiant attitude this belief will continue. If on the other hand they obviously try to do the best they can under adverse circumstances, the public will sooner or later put the responsibility where it belongs.

The Station Agent.

The station agent, whose work is the main topic of a communication printed in another column, fills an important place in railroad work. Like the passenger conductor, he must be master of a large mass of details which will enable him to properly perform his work, technically speaking; and, in addition, should be equal to the general passenger agent himself in the art of dealing with men. Unlike the passenger conductor, who meets a great number of customers, but comes in contact with a large share of them only for a minute or an hour each, the agent, dealing with a smaller circle of patrons, must strive to please them uninterruptedly for a series of years. A small town where receipts may be anything but heavy may have such people for residents and be so situated as regards competition as to demand qualities in an agent similar to those found necessary in superintendents, traffic officers and others whose services

warrant the payment of salaries several times that of the ordinary station agent. Then the agent's position, as related to his superiors, is somewhat peculiar. Although receiving a small salary, and therefore presumably possessed of a limited cranial capacity, he must keep his ears alert for instructions from three independent sources, the auditor's, the division superintendent's and the traffic manager's offices; and the latter is divided into two, which have little practical sympathy in details. Other "bosses," like the superintendent of telegraph and the roadmaster, come in to fill up spare hours. And yet, with all these, the agent at a small station, as our correspondent says, learns to do his work in his own way. What is the trouble? Why is a position requiring such versatility so often poorly filled? The immediate answer to this is that at many stations the income from the business will not warrant the employment of an experienced man of a sufficiently high grade of intelligence; so the question comes back to the point brought out by our correspondent; how shall we best qualify such men as *can* be afforded? Some towns can hardly afford any agent at all, as was illustrated in a case before the Kansas railroad commissioners, recently published: and yet where a man has once been stationed at a place the manager naturally desires to establish there a meeting point for trains and a telegraph office and to give patrons as many facilities as possible. Shall the salary be raised and an experienced man be appointed, or shall the farmer's son who is available be trained up to the best standard he is capable of?

A main reason why such agents are not more proficient, and for their learning to do the work in their own way is shown in our correspondent's letter. Most of the superior officers before mentioned give their orders by letter, and the only department which tries to acquire an intimate knowledge of how things are run at the small stations is the auditor's. Considering this fact it is somewhat remarkable that many agents' methods approximate the proper standard so nearly as they do. An error similar to that mentioned by our correspondent involved a $3,000 law suit at Albany, N. Y., not long ago, as our readers will remember. The details of freight office work require very intelligent care, and small mistakes may involve large financial consequences as small mistakes in train work precipitate serious physical disasters.

The pith of our correspondent's scheme lies in the prominence given to the idea of training men at the *beginning* of their career. We would go a step further. While heartily agreeing with him as to the expediency and necessity of well qualified inspectors—which, by the way, cannot be had at a moderate salary unless the superintendent carefully watches his force with a view to picking out the right man—we must say that the training of young men for agents before giving them appointments ought to receive much more careful attention than it does. Large numbers of small stations are manned by agents who receive their only preliminary training at the same station, or at another very much like it. The person thus gets narrow views, and remains a narrow-minded agent; or, if he be a particularly smart fellow, soon outgrows the low salary and goes elsewhere. We thus have dull persons whom it is useless to teach, or teachable ones who will soon carry the teaching away to give its benefit to some one else.

As a station agent is not to receive a princely salary, his preliminary education should not occupy a long time, and should therefore be drawn from the best sources. A short term under a good teacher is better than a long one under one whose teachings are inadequate or require to be subsequently unlearned. Following the examples set in other lines of business (and also seen frequently in the higher circles of railroad work), we at once see that the candidate should be trained in a half dozen different places. To qualify himself for a medium-sized station he should work a while in a city freight office, be a platform man in a large passenger station (where he could learn suavity and the arts of dealing with passengers better in a month than in a year at a small village), and sell tickets and work the telegraph where he could get a good *amount* of practical training with the least loss of time, so that a passenger with a $50 bill would not scare his arithmetic out of him and a sudden rush of messages would not paralyze his sending nerves. It is a familiar fact that clerks from the freight auditor's office make the best station agents, so far as clerical work is concerned, and that brakemen, doorkeepers, and even office-boys, who have met large numbers of people, excel in making themselves agreeable to customers. The local freight agent of the Pennsylvania system in a Western city has, in a dozen years, taken 40 lads into his office and sent them out to fill reponsible positions on the road. To get well qualified agents a manager or superintendent should see to qualifying them himself. He can easily place them in the right school if he will change them around often enough.

The practical question is, does it pay to give this varied education? If it costs a great deal of money, many superintendents would feel compelled to answer that they must continue to appoint men with one-sided or insufficient training, running the risk of detriment to business during the first few months or years while deficiencies are being remedied. But it is quite possible, in fact likely, that increased appropriations would not be the largest factor in the problem. A proper system is the necessary beginning. Those who hire new men must have infused into their minds the principles necessary to be followed in employing men with a view to their permanent value to the company, and not merely to the present filling of one circumscribed position. To train a young man or boy in, say, three different offices or departments within a single year would require care and concerted action on the part of a number of heads, and should be done according to a systematic plan under the authority of the general manager, but the care and attention demanded would be well spent. The improvement of station buildings and their surroundings is in many places being prosecuted more assiduously than is the elevation of the attendants to match them. There should be a change in this respect.

The Telegraph Department of the Missouri Pacific.

All telegraph superintendents and most other railroad officers have had more or less experience with the telegraph operator who allows that side of his disposition which most resembles a hog's to actuate his behavior on the wire. When business is specially heavy or wherever wires are crowded with messages, he fights with the other operators until he subdues them, and when he once secures the wire monopolizes it for an hour or so. The ordinary remedy for this annoyance is an order to all employés to make less use of the telegraph (which is obeyed by those who are naturally "slow," and wholly disregarded by the careless ones, who send the most wordy and unnecessary letters by wire), or the building of additional lines. But the stringing of new wires is somewhat expensive, and the correction of employés' judgment or their habits of promptness should be secured by other methods than setting operators over them as censors.

One way of increasing the efficiency of wires is that employed on the Delaware, Lackawanna & Western, and described in another column of this issue. But the quadruplex, although cheaper than new wires, still entails some expense and requires the constant care of good operators. The condition of many lines could be greatly improved without any expense at all, simply by the introduction of better discipline among the operators. As an example of a successful aid in securing good discipline we give below some of the rules now in force on the Missouri Pacific, under Superintendent of Telegraph C. W. Hammond. The circuits of this road are long and duplication of wires is correspondingly expensive. The full and economical use of all the wires was therefore found to be of importance.

These rules are printed on cardboard, so as to be posted in the offices, and embody, besides the special feature to which we allude, a number of other points which are somewhat unusual. The linemen, under charge of the general foreman, not only inspect instruments and material in offices, but also examine message files and look after the telegraph business of stations generally. The day operators are not only the nominal managers, but must examine night operators to test their qualifications. Whenever any office is closed, day or night, a notice must be posted on the outside of the office door showing where the operator can be found. Students and private lines are excluded from the offices and premises of the company. Tramp operators would seem to be somewhat common in the Southwest, as there is a paragraph which specifies that telegraphic application for employment will not be sent free. The use of books for receiving and sending messages is forbidden, and messages for delivery on trains to any one except trainmen must be inclosed in envelopes. The rules concerning rights to circuit are as follows, in full:

14. When an operator has called an office ten times, he will yield to any other office wanting the circuit. When an operator has business for more than one office, and the first does not answer, he will stop on the ninth call, and proceed with the second or any number of offices in this manner; but must not use his "*ten call*" privilege to call any office more than once during one possession of the circuit, unless the circuit is otherwise idle. A sending operator can retain the circuit by saying "*ahr*" after the signature to the message he is sending and before signing his office call; but this must not prevent him from taking any business held for him by any office to which he sends. In these cases, the operator in first possession of the circuit will say "*ahr*," "*O. K.*," then sign and call another office. If the operator in possession does not wish to retain the circuit, it will revert to the latest receiver upon his saying "*ahr*," "*O. K.*," and signing.

23. The following signals will take precedence in the order assigned them below, and must be observed strictly without question or exception. The individual signals must never be used, except when authorized in writing, or personally, by those to whom they belong, or for answers to messages sent under signals. Signals on messages and answers thereto, going over more than one circuit, must be sent and copied at the beginning of such messages by each sending and receiving operator.

First—"Time." Cannot be interrupted, as it is sent automatically.

Second—"89." Danger, to be used only to avert accidents. Whenever used special written report must be made by operator using it to both division superintendent of road and assistant superintendent of telegraph.

Third—"Wire." Used only by general foremen, linemen and those specially appointed to test wires.

Fourth—"87." President, vice-presidents, general manager and general superintendents.

Fifth—"85." General Auditor.

Sixth—"81." Superintendents and division superintendents to take circuit over signal 9.

Seventh—"9." Train Dispatcher.

Eighth—"28." Superintendents and division superintendents to take circuit below signal 9.

Ninth—"27." Superintendent Bridges and General Road Master.

Tenth—"17." Operators calling for train order or to repeat train order, or to send 24 report.

Eleventh—"8." Adjust! You are breaking.

Twelfth—"Rush." To be used on messages not entitled to signals, but that cannot wait for regular turn.

Thirteenth—"22." Car reports.

Fourteenth—"14." Operators notifying dispatchers that they wish to be absent.

Fifteenth—"21." Ordering meals for trains.

24. In all cases where circuit is rightfully taken or interrupted under these rules, it may be done at any time, even in the middle of a message or a word; but this does not warrant the calling of an office more than ten times without an interval of at least two minutes, even with signals.

The rules require that an office exchanging a considerable number of messages with another shall send ten messages, then receive ten, and so on.

Abbreviations for the ordinary phrases, such as "I am busy," "What is the weather," etc., are tabulated, but have no authority connected with them.

Among the daily reports for which Mr. Hammond has special forms with cipher abbreviations, so that they can be quickly sent by telegraph, are: Daily report of cars, in which there are 60 columns; daily telegraph report of passenger cars not required for regular service, in which the car numbers are given under 11 different heads; daily telegraph report of the number of trains of different kinds on each division, and daily report of the operations of the company's mines.

Per Diem Car Service.

At a meeting of the committee on car mileage and per diem rates of the General Time Convention, held at the office of the Secretary in New York, Dec. 20, the following recommendations were agreed upon, and a copy of them has been sent to each of the roads belonging to the Time Convention:

1. That the compensation for the use of cars be fixed at the rate of ½ cent a mile and 10 cents per day.
2. That a circular be issued to the officers of all roads members of the convention, asking their opinion as to the fairness of the above named rates, and whether they will be willing to adopt them, provided their principal connecting and competing lines will do the same.
3. That a general agreement shall be made among the roads adopting the system to maintain the same for a period of one year, in order that a test of its working may be made at all seasons.

It will be observed that the rate of compensation is the same as that recommended by the per diem committee of the Car Accountants' Association, which recommendation was principally based on the statistics showing the performance of the cars owned by 47 roads presented to the convention at the last meeting. The Time Convention committee did not at that time fully indorse the Car Accountants' recommendation. They adhered to the ½ cent per mile and 15 cents per day rate, but in doing so stated that "believing that the plan proposed is a step in the right direction, and that the principle involved is of more importance than the particular amount fixed in carrying it into execution, we would not oppose the rate recommended by the Car Accountants' committee should a majority of the roads prefer it."

From the present action, therefore, it may be assumed that further study of the statistics presented and of those which have since been collected, has convinced the committee that the lower rate is the fairer one, and will be acceptable to the greater number of roads.

The statistics above referred to, covering the service of cars on 47 roads in different sections of the country, and in most cases for a period of three months, brought out the fact that under the present performance of cars the ½ cent per mile and 10 cents per day rate would about equal the amount paid per day under the established rate of ¾ cents per mile. The borrowing roads, therefore, have now an opportunity to make a new trial under more favorable circumstances, and it is to be hoped that they will carry out the recommendation of the committee. They will now be better off than the lenders. The endorsement of the rate by the roads having large equipments will be a severe trial of their faith in the efficacy of the per diem system to increase the movement of cars. It has been shown that freight cars are unprofitable property from a car service standpoint when the earnings fall below 25 cents per day, and under present performance at the rate recommended the earnings would be only about 22 cents per car per day. If it is found, therefore, that the large car owners, many of which have already had some experience with the per diem system, are willing to adopt this low rate, it may be taken as good evidence of their confidence that the per diem system in operation will correct some of the abuses now existing unchecked, and produce a larger mileage per car, which will ultimately bring the income to a paying basis.

The educational leaven heretofore introduced is undoubtedly working, and progress is discernible. While the day of the general introduction of the reform, which is still needed as badly as ever, cannot yet be said to be near enough to be predicted with confidence, the determination of the committee not to let the matter drop, to keep up the agitation, war

rants continued hopefulness; and the action of the spring meeting of the convention will be awaited with much interest.

The Poughkeepsie bridge was officially transferred by the Manhattan Bridge Building Co. to the Poughkeepsie Bridge Co. Dec. 31, although the Union Bridge Co. will not have entirely completed its work for some weeks yet. Trains can now be run over the bridge, and the first one crossed officially last Monday. It consisted of an engine and two cars, carrying officers of the various companies interested in the bridge, and their guests. An engine was run over the bridge Saturday, but in the history of the bridge this crossing will probably be regarded "constructively" as not having taken place. As the bridge now passes from the hands of the builders to those of the users, it may be well to note here the names of those who have had the most prominent and responsible part in its building.

The bridge is owned by the Poughkeepsie Bridge Co., and the contract for building it was taken by the Manhattan Bridge Building Co., of Philadelphia. The Union Bridge Co. built it for this latter corporation. The scheme for the bridge has a long history which it is not necessary to recite again. After its various vicissitudes the money to build the bridge was finally obtained largely through the efforts of Mr. W. W. Gibbs and Mr. J. C. Stanton. The position of the bridge and practically the length of spans were fixed before the present contractors took hold of it. Mr. P. P. Dickinson has long been and still is the Chief Engineer of the bridge company, and Capt. Eads was among those consulted in the preliminary studies. Mr. A. B. Paine is the Chief Engineer of the Manhattan Bridge Building Co., who, as has been said, took the contract to build the bridge as a construction company. The Union Bridge Co. are, however, the engineers and actual building contractors. They are responsible for the design, material and construction of the entire work. In the design Messrs. T. C. Clarke and Charles Macdonald were particularly charged with the foundations, and Messrs. C. S. Maurice, Geo. S. Field and Edmund Hayes with the superstructure. Mr. Clarke has had especial charge of the operations of building the bridge, but Mr. J. F. O'Rourke has been the resident Chief Engineer for the Union Bridge Co., and his skill and energy are recognized by all who have watched the progress of the work. The contractors were Messrs. Dawson, Symmes & Usher for masonry, concrete and timber; the Atlantic Dredging Co. for the dredging, and Messrs. Wm. Baird & Brother for erecting. The work of all of these firms has been most creditable. The remarkable success with which the caissons were sunk is greatly due to the skill of the dredging company, and the erectors have made a fine reputation in this and other recent work.

On a certain Mexican road recently a native was run over and killed by a freight train. The report of the occurrence states that the trainmen came through to the terminus in this country "but returned immediately to stand the regular investigation * * * The fear which was formerly felt by American trainmen that the authorities would mistreat them has gradually passed away, and they now appear to be as willing to stand trial or investigation in Mexico as in the United States. The engineer and the conductor were held on a nominal bond, instead of being placed in jail as was formerly the custom." From this it would appear that Mexico is making progress in civilization. Even an ignorant policeman should be able to see, by ten seconds' reflection, the absurdity of trying to establish any relation of cause and effect between the trainman's intention and the victim's death in cases of this kind; and the likelihood of there being any good reason for suspecting gross carelessness, a degree of heedlessness justifying the judicial punishment of an engineer, should be almost as readily disproved. The arrest of the conductor of a train is about as useless and unwarrantable a proceeding as the imprisonment of the superintendent. It is gratifying to see that the Mexicans are coming to see these things in their true light, and to change their action accordingly. We wish we could say as much of New York city.

The sordid thoughts of Wall street and the humdrum life of repair shops do not control all departments of railroad activity. The interesting and instructive cabinet of Colorado minerals lately sent out by General Passenger Agent C. S. Lee of the Colorado Midland as a Christmas present to coupon ticket agents is accompanied by a circular calling attention to the attractions of that road in language which indicates a literary bureau of unusual resources. The following is a sample:

"While the Colorado Midland, the first standard gauge railroad built in the heart of the Rocky Mountains, is known as the new wonder in railway building, it is constantly adding new features to its attractions. Two new and marvelous inducements are now offered. * * In the centre of the continent, deep down in the bowels of the earth, some fairy alchemist, banished from the sound of ocean's roar, has been at work. With the echo of breakers in her ear, the love of the sea in her heart, and the subtle art at her command, she has touched the granite rock with magic wand, and brought forth abundant waters, hot from the fiery depths and salt as the distant sea. So strongly impregnated are the waters with the basis of salt that a bath at Glenwood Springs is equal to a plunge in the ocean. In addition to the elements of the surf the springs contain to a large degree the medicinal qualities of six-sevenths of the hot springs of America. Such marvelous works of nature, coupled with the skilled work of man in the building of a swimming pool, mammoth in its proportions of 700 ft. in length and 90 ft. in width, and bath houses perfect and elegant in all their appointments, make the most luxurious bathing to be had in the world. * * Another attraction is a carriage road to the summit of Pike's Peak." * *

The Italian government has recently published a report on the steam tramways in the kingdom, according to which it appears that Oct. 1, 1888, there were completed no less than 110 different lines, with an aggregate length of 1,405 miles, all but 114 miles of which were laid in public streets or highways. The first of these was opened for traffic only about ten years ago (June 8, 1878), so that it is evident that these means of conveyance, which are, however, properly not tramways, but light railroads, have been found very advantageous. The number of different companies working these 110 lines is 44. A single company (that of Ticino) works 10 lines with 155 miles of road. By far the larger part of these lines are not in cities, but in the country.

All rates, passenger and freight, in both directions, between Chicago and Southwestern, Western and Northwestern points, were restored on Jan. 1. The agreements by which this result was brought about seem to be of a somewhat temporary nature; their details are not given, and it seems to be uncertain whether all the roads have entered a binding agreement. Chicago ticket scalpers are said to be still plentifully supplied with tickets to St. Paul at $2 to $3 less than regular rates, and freight contracts on various commodities at reduced rates are said to be still in force on two or three Southwestern roads.

TECHNICAL.

Locomotive Building.

The Manchester Locomotive Works is constructing a heavy 10-wheel freight locomotive for the Concord road. Engines as large as this are not common in that section of New England.

Car Notes.

The Oregon Railway & Navigation Co. has received 200 box cars from the Pullman Car Co. The road is also having built 400 more, which it is expected will be completed by Feb. 1.

The Cincinnati, New Orleans & Texas Pacific last week closed a contract with the Litchfield Car Works, of Litchfield, Ill., for 100 refrigerator cars, with the privilege of increasing the order to 200 cars.

The Chicago, Rock Island & Pacific has under contract, for January and February delivery, 300 box cars and 100 double-deck stock cars for the lines west of the Missouri.

Bridge Notes.

The Phœnix Bridge Co. last week completed a through span girder iron bridge over Germantown avenue, at Wayne Junction, Pa., on the Germantown branch of the Philadelphia & Reading Railroad. A similar bridge on the New York branch is being built.

The new bridge erected by Delaware County over Darby Creek, at Clifton Heights, Pa., has been finished and accepted by the County Commissioners. It is of iron and stone, and cost about $15,000.

As was announced some weeks ago in these columns, th Edge Moor Iron Co., of Edge Moor, Del., has transferred to the Edge Moor Bridge Works, of Edge Moor, that branch of the company's business embracing the building of iron and steel bridges, viaducts, elevated railways, marine piers, iron and steel structural work for buildings and roofs, and the manufacture of wrought-iron turn tables, steel eyebars, upset rods, sleeve-nuts and clevises. The transfer includes the shops and entire plant heretofore used by the company in the manufacture of the above-mentioned product.

The Edge Moor Bridge Works has issued the following circular: The Edge Moor Bridge Works, in assuming the business transferred to it as per the above announcement, desires to call attention to the fact that it has been organized with the following officers: Henry G. Morse, President; William Sellers, Vice-President; William H. Connell, Treasurer; William F. Sellers, Secretary, and F. W. Heisler, Purchasing Agent. The bridge manufacturing plant has been increased by the building, during the past year, of a girder shop 435 ft. long and 215 ft. wide, fitted with new and improved machinery, whereby the capacity of the works is more than doubled, and the cost of the product materially diminished. * * * A. Gottlieb, Consulting Engineer; Major Block, Chicago, is Western Agent.

The following bids for constructing a viaduct at Hawk street, Albany, N. Y., were opened by the commission: Wrought Iron Bridge Co., Canton, Ohio, $100,827; Edge Moor Bridge Works, Wilmington, Del., $96,500; Rochester Bridge Co., Rochester, N. Y., $91,000; King Iron Bridge Co., Cleveland, O., $100,500; Groton Bridge Co., Groton, N. Y., $105,990; Berlin Iron Bridge Co., East Berlin, Conn., $92,133; Sullivan & Ehlers, Albany, N. Y., $88,337; Hilton Bridge Construction Co., Albany, N. Y., $87,336.50. The Hilton Bridge Co. was awarded the contract.

The contract has been let for a steel bridge at Clarke street, Chicago, the cost of which is estimated at $150,000. The substructure was let to Fitz-Simons & Connell, and the superstructure to the King Iron Bridge & Manufacturing Co., of Cleveland.

The County Auditor asks for proposals for the construction of all bridges that may be ordered for one year from April 1, 1889. Address at Council Bluffs, Ia.

The bridge across the Blanchard River, west of Ottawa, O., has been completed by the American Midland Railroad Company.

Bids for the erection of a bridge over Lansdown avenue, Philadelphia, were as follows: I. H Hathaway, $6,835; J. & T. Oliver, $7,400; R. A. Malone, $7,700; W. H. H. Achuff, $9,700; Peter P. Diehau, $9,400; C. J. Kennedy, $9,275.

The official transfer of the Poughkeepsie bridge from the contractors to the Poughkeepsie Bridge Company was made Dec. 31, John I. Platt, the Vice-President of the Bridge Company, receiving the property in behalf of his company.

Manufacturing and Business.

Mr. J. M. Foster has a large number of orders for his pressure regulators for use in steam car heating. He is furnishing them to the Jersey City, West Philadelphia, Harrisburg, Altoona and Pittsburgh shops.

The partnership heretofore existing between A. H. Frost and E. G. Peterson, under the firm name of Frost & Peterson, manufacturers of veneer seatings, car ceilings, settees, etc., at 161 West Eighteenth street, New York, has been dissolved by mutual consent. The business is to be continued by E. G. Peterson and W. L. Peterson under the name of Peterson Bros.

The Birmingham Rolling Mills company write that they are using magnolia metal for bearings in all departments of their mill, and that with its use they have no hot journals.

The National Paint Works, of Williamsport, Pa., manufacturers of Elliot's asphaltum paints, have during the past year made large sales to Guatemala, Vera Cruz, Venezuela and other foreign countries. Their orders from railroads and bridge builders during the past year have been heavy, many of them for carload lots, and the orders on hand for the new year are numerous.

The Automatic Track Layer Construction Co. has been chartered at Minneapolis by S. W. Roberts, L. J. Drennan, S. R. Nettleton, A. C. Houghton and G. L. Watchman to manufacture the Roberts tracklaying machine. The amount of capital stock is $1,000,000.

The Aluminum Brass and Bronze Co., recently formed for the manufacture of aluminum and silicon sheets, rods and wire, under the exclusive rights in the United States of the Cowles patents, is erecting buildings covering two acres at Bridgeport, Conn., which are expected to be ready in April next. The officers of the company are: F. J. Kingsbury, President; William Powe, Treasurer; F. J. Kingsbury, Jr., Secretary; Dr. Leonard Waldo, Electrical Engineer; Charles S. Morse, Mechanical Superintendent.

The New York, Lake Erie & Western has given a contract to Farrar, Tretts & Rood, of Buffalo, N. Y., to make the iron castings for the road.

Iron and Steel.

It is now thought that the Bessemer converting department of the new plant of the Allegheny Bessemer Steel Co., at Duquesne, Pa., will commence operating early this month. The rail department will commence operations probably in March.

The relining of Grace Furnace, of the Brier Hill Iron & Coal Co., at Youngstown, Ohio, is expected to be completed, and the furnace ready for blast this week.

The Lewis Foundry & Machine Co., Limited, of Pittsburgh, is erecting a 12-in. merchant train, together with the engine and rolls, for the Horseshoe Machine Co., of Anniston, Ala.

The foundry and machine shop in the Soho Iron Mills, of the Moorhead-McCleane Co., at Pittsburgh, were considerably damaged by fire recently.

J. P. Witherow, of Pittsburgh, has contracted with Raney & Berger, of New Castle, Pa., to erect in their blast furnace a new stack, 23 ft. bosh and 80 ft. in height, and a tower hoist of wrought iron attached, to be used as a spare stack.

Bids were opened at the Navy Department last week for machine tools for the Mare Island, California, Navy Yard, under an appropriation of $100,000, for the purpose of fitting the yard for the repair of steel ships. There were 49 items, the principal one being a set of bending rolls, for which the Niles Tool Works made the lowest bid, $40,290.

Mr. Robert H. Coleman has decided to at once erect another new furnace at Colebrook, Pa.

Shipbuilding on the Delaware.

The iron shipbuilders along the Delaware River are crowded with orders for large ocean steamships. One of the largest shipbuilders said the contracts on hand would take two years to complete. The Pacific Mail Steamship Co. are in the market for two iron steamships of about 5,000 tons each, to cost $2,000,000, for the San Francisco and Central American trade. The Ward Steamship Line, to Cuban ports, contracted with the Delaware River Shipbuilding Works, on Monday last, for two iron steamships 310 ft. long, to register 3,000 tons each. Contracts have also been made for two iron steamships for the Ocean Steamship Line, to ply between New York, Philadelphia and Savannah. Charles Mallory contracted with the Delaware River Shipbuilding Co. for a 3,000-ton coasting steamer to cost $350,000, for the Galveston line. The Morgan Steamship Line, plying between New York and New Orleans, the Pacific Improvement Company, of California, running to the North Pacific ports, and the Oregon Railway Company are also in the market for two new steamers each. Col. Edgarton Hogg, of the Oregon Pacific Railroad Company, also needs two iron steamships for the trade between San Francisco and Yaquina Bay, Oregon. The Merchants and Miners' Line is building a new steamship at Wilmington, Del., and Boulton, Bliss & Dallet have two iron ones at Cramps' yard and a wooden vessel at Bierly, Hillman & Co.'s yard, for the Venezuela trade. A contract for the construction of a revenue steamer for service in the Charleston, S. C., district, was, on Monday, awarded to Pusey, Jones & Co., at their bid of $72,600.—*Iron Age.*

An American Contractor in Italy.

The Italian Ministry of Public Works, Dec. 10, received bids for the construction of a branch railroad from Santa Eufernia to Racadi. There were three Italian bidders and one American. The Italian bids were 24, 23 and 22 million francs, respectively, while the American (Mr. Dos Passos) offered to do the work for 16,500,000, and was awarded the contract.

The Schenectady Locomotive Works.

The year just closed has been that of the greatest output of these works. There were built 301 locomotives of an average weight of 98,000 lbs. exclusive of tenders. The following table shows the number built of each class:

Cylinders.	Eight-wheel.	Ten-wheel.	Twelve-wheel.	Consolidation.	Six-wheel switch.	Four-wheel switch.
14 × 22..	....	....	....	....	....	1
15 × 22..	....	....	....	....	....	2
16 × 22..	....	....	....	....	....	10
17 × 24..	8	....	....	....	19	....
18 × 22..	6	....	....	....	....	....
18 × 24..	65	74	....	....	19	....
18 × 26..	10	20	....	....	....	....
19 × 24..	....	21	....	....	4	....
19 × 26..	....	19	....	....	....	....
20 × 24..	....	....	....	6	....	....
20 × 26..	....	....	13	4	....	....
Totals.	89	134	13	10	42	13
Grand total						301

The Grand Trunk Tunnel.

Preparations are now being made on both sides of the river to recommence work on the tunnel under the St. Clair River. Already, $125,000 have been expended in preliminary work. It was found that the sinking of shafts on the river banks presented a great many difficulties and some time ago the Grand Trunk took the work out of the hands of Sooy-Smith & Co., the contractors, and decided to take charge of it themselves. It was decided to go back from the river some distance and begin work on the tunnel proper. Work is to be begun at once. The work of excavating at Port Huron will begin at 300 ft. west of the shaft. The opening will be 200 ft. wide and will have a uniform decline until the mouth of the shaft is reached. The shaft will be 22 ft. in diameter and 50 ft deep. At the bottom of this shaft the drift toward the Canadian side of the river will be begun. The drift will be about 22 ft. in diameter. The distance from the mouth of the shaft to the river is 2,000 ft. and from one river bank to the other 2,200 ft.

The New Cincinnati Bridge.

The first train over this bridge crossed on Christmas day.

On Aug. 26, 1888, at 10:40 a. m., the false work under the uncompleted channel span was swept away by the flood in the Ohio. Of this disaster we gave an account at the time. The false work for this 550 ft. span had to be entirely rebuilt, and some of the iron work was lost. On Sunday, Oct. 8, 1888, sixty-three days after the disaster, the span was finished.

The 490 ft. span on the Ohio side and the approaches were completed in fifty-eight additional days. The bridge proper is 5,320 ft. long, and, including all approaches, 17,000 ft. It has two 490 and one 550 ft. spans. It is double-tracked, and has wagon and street car ways 11 ft. 3 in. wide, and foot passages 5 ft. wide. The bridge cost about $5,000,000, including real estate. Ground was broken for the first caisson in June, 1887, and iron-work was begun in March, 1888. As high as 2,000 men have been employed at a time, and since the accident work has been pushed night and day. The contractors were: Pneumatic work, Sooysmith & Co., of New York; masonry, Mason, Hoge & Co., Frankfort, Ky., and D. Shanahan, Louisville, Ky.

A Fire Proof Postal Car.

The first car manufactured by the American Fire Proof Steel Car Co., of Chicago, was lately completed and sent to Chicago. It was exhibited to a party of capitalists and railroad men at the Dearborn station and a run of two hours was made. During the trip the car was examined by all on board. This car, built for the United States Postal service, was fitted with regular passenger car trucks, and is as flexible and as easy riding as any of the common day coaches. It is fitted with all the paraphernalia of a postal car and was ready for actual service on the Louisville, New Albany & Chicago The external appearance of this car is quite like that of the day cars which we are accustomed to see on Western roads. It had the uneven appearance so common to sheet metal work, but the flatness characteristic of that class of work is removed by the vertical corrugations, which look exactly like battens, placed about 8 in. apart along the sides and ends of the car. The car trucks were made by the L., N. A. & C. Co. after their standard designs. They are heavy trucks made of steel and wood. These trucks are equipped with the National hollow brake beam and the Fowler cast-steel wheel.

This car was constructed at the New Albany car shops of the L., N. A. & C., under the supervision of Mr. Chas. Coller, the Master Car Builder of that road. The workmanship displayed in its construction is very good throughout, and reflects credit on its builders. It is stated by Mr. Coller that cars of this design can, in the future, be built at a much less expense. Several changes in the design will enable the process of erection to be much simplified. This car is illustrated on another page.

Electric Light in the Hoosac Tunnel.

The work of putting the electric light plant in the Hoosac tunnel has been completed, and the system was started on a 30-days' test, Dec. 27, after which, if successful, it will be turned over to the Fitchburg company. The building at the west portal contains two 125 horse-power boilers and a 125 horse-power engine. Here, also, are three Westinghouse dynamos, each having a capacity of 650 lights, and two direct-current machines. There are 1,250 lamps in the tunnel, arranged in sections of 20 50-volt lamps in a section, so that should a break occur that section may be shut off. The lights are placed 40 ft. apart on either side of the tunnel, making a light every 20 ft. Every 250 ft. there is a "man-hole" at which is a blue light. The man-holes" are places of refuge from trains for men working in the tunnel. Over 40 miles of lead-covered wire was used in the system, all of it being laid in wooden conduits along the sides of the tunnel. The work of putting in the system has taken nearly a year, being prosecuted under great disadvantages. The tunnel is now well lighted, and a trip through is very interesting.

The Widdifield & Button Brake.

It has been arranged to make a trial of the electric and automatic train brake of Widdifield & Button and Widdifield & Bowman on the Lehigh Valley road. The trial will take place Jan. 10, commencing at Metuchen at 9 o'clock a. m. A train will run from Metuchen to Easton and return.

Coupler Tests.

The Consolidated Coupling Co. made a test of its M. C. B. type coupler in the yards of the New York Central & Hudson River road at West Albany on Dec. 27, in the presence of a number of prominent railroad men and others. The trials consisted of running cars together at considerable speed for the purpose of testing the strength of the buffers to resist shocks. With both cars fitted with the company's coupler an engine backed one car against another at rest, starting from a distance of about 10 ft. and increasing the speed as rapidly as possible. In each case the coupling was perfectly effected. The coupler was also tested with others of the same type. Next the effect of a sudden pulling strain on the buffer was tested by connecting two cars with a heavy steel chain with several yards slack and then pulling them apart suddenly with sufficient force to break the chain. In some of the buffing tests one car was pushed against another at a speed of 20 miles an hour.

Alabama Iron.

All the furnaces in the Birmingham district are doing an immense shipping business, and all are hampered by the lack of cars. Eighteen months ago there was no regular eastern pig iron business from Birmingham. On the other hand the East was used as a dumping ground for iron that could not be disposed of in the regular western markets. Now there is a constant and legitimate trade with Baltimore, New York and other eastern seaport and interior cities. About one-half the iron from the Birmingham furnaces now goes to points north of the Ohio River, east of the Mississippi and west of Pennsylvania; about one-sixth goes to eastern cities in direct competition with the Pennsylvania and foreign pig, while the remainder goes to St. Louis, Kansas City and other trans-Mississippi points.—*Birmingham Age-Herald.*

The Westinghouse Brake on the Gotthard Railroad.

The "Abstracts of Papers" of the Institution of Civil Engineers contains the following note:

Since the end of March, 1888, the introduction of the Westinghouse brake on the Gotthard Railroad has been definitely decided on. Hitherto the ordinary vacuum brake has been employed on this line, and the directors in adopting the automatic pressure brake have only yielded to the representations of the Railroad Department of the Swiss government, which was very desirous of having a uniform system of brake on all the railroads.

For the long steep gradients occurring on the Gotthard Railroad the ordinary arrangement of the automatic Westinghouse brake was not considered perfectly satisfactory, and a double line of pipes, in connection with an additional valve, as used on the Paris-Lyons-Mediterranean Railroad, was adopted. By means of this valve, designed by Mr. Henry, chief engineer of the above named line, the brakes can be controlled independently of the auxiliary reservoirs and triple valves, direct from the main reservoirs without interfering with the automatic action, while when the latter comes into play all the brakes can be simultaneously released by the driver.

On the 14th and 15th of March trial trips were made to test the efficiency of the new brake with satisfactory results, which, however, as regards regularity of speed in descending long gradients were not superior to those obtained with the vacuum brake. The train consisted of a locomotive, tender and ten vehicles, weighing together 179.37 tons, to 53 per cent. of which the Westinghouse brake was fitted, or, including all, brakes could be applied to 71 per cent. of the total load. The trial took place over maximum gradients of 1 in 38 (139 ft. per mile), and on the latter gradient with all the brakes in operation, reversed engines and the use of sand on the rails, the train was brought to a stop in 10⅕ seconds when running at a speed of 28 miles per hour, in a distance of 272 feet.

Locomotive Traverser.

The locomotive traverser has been employed since 1882 on the Northern Railway of France, for the movement of the heaviest as well as the longest locomotives in use on that line. It is 46 ft. in length, 27⅕ ft. wide, and travels in a pit or depression only 13 in. deep—much shallower and less inconvenient than the deeper pits in use previously. The traverser travels on six double rails, or couples of rails, by two sets of rollers 6¼ ft. in diameter, sufficiently wide—7⅕ in.—to take a complete bearing on each couple of rails. The table carries a line of rails of the normal gauge to receive the locomotives and tenders, and a third rail to a wider gauge in order to receive a traveling crane when required for moving heavy pieces for repairs. The framing consists of rolled iron girders about 9 in. deep, to which the plummer-blocks for the traveling axles are secured. The motive power is supplied by a double cylinder vertical steam-engine, with a vertical boiler combined with a set of horizontal flue tubes. The carrying wheels are turned by the engine, for the movements of translation. A capstan also is worked by the engine. In case the engine is disabled, means are provided for working the traverser by the power of six men.

The following are the leading particulars of the traverser:

Weight, empty	57 tons.
Load (engine and tender)	71 "
Total weight of the traverser loaded	128 "
Speed, loaded, per minute	95 ft.
Diameter of cylinders	5⅕ in.
Stroke of pistons	8 " nearly.
Revolutions per minute	180
Power at the shaft	21 h. p.
Power utilized	16 "
Pressure in the boiler	8 atmospheres
Area of the fire grate	3.65 sq. ft.
Heating surface	110.5 "

Crab: six men each exerting a pressure of 22 lbs., move the transverser at a speed of 6⅕ ft. per minute.—*Abstract of papers Inst. C. E.*

THE SCRAP HEAP.

Notes.

During the year 1888 there were 154 persons killed at steam railroad crossings in Philadelphia.

The steamboat "Cape Charles," belonging to the New York, Philadelphia & Norfolk, which was built to transport passenger cars across Chesapeake Bay, has been sold to the Housatonic road for $105,000. It is stated that it is to be used by the latter company in New York Harbor; this doubtless means between New York and Norwalk, Conn.

General Passenger Agent Lambert, of the West Shore Railroad, says that the obstruction in the West Point tunnel is now nearly removed. It is expected to have trains running through the tunnel regularly within a week.

An order from the Superintendent of the Susquehanna division of the Erie directs that "all cars of oil must be placed in the middle of the train, no matter what the destination is nor what kind of oil it may be."

Governor Larrabee, of Iowa, has sent instructions to some of the county attorneys of the state, calling their attention to the provisions of the laws in regard to the regulation of railroads, and asking them in case they at any time become satisfied that the law is being violated by any road to enter complaint before the Grand Jury.

The Wheeling & Lake Erie and Pittsburgh Coal Company has been organized with a capital stock of $2,000.000, of which $1,000,000 is in bonds. James M. Ham is President. The company has bought valuable coal lands along the Wheeling & Lake Erie extension to Wheeling, W. Va., and will at once open the mines, so as to be ready to ship coal upon completion of the extension. The coal is the Pittsburgh No. 8 vein.

Meetings of the Brotherhood of Engineers, attended by delegates from all parts of the West, were held in Chicago last week, and a conference was had between a Committee and Vice-President Stone of the Burlington road. Representatives of the engineers reiterate the old assertion that other roads are aiding the Burlington financially, and claim that Brotherhood engineers from the Burlington are refused employment in various parts of the country because they are Burlington strikers.

Conviction of Bauereisen.

Bauereisen, the leader of the dynamite wing of the Chicago, Burlington & Quincy strikers, has been convicted of guilty complicity in the conspiracy to destroy Burlington property by dynamite, and his punishment has been fixed at two years in the penitentiary. Under the testimony given there could have been no other verdict but one of guilty. The testimony of the prosecution was not materially shaken at any essential point; and the attorney for the defense admitted that the man had as fair a trial as could have been expected. The jury was unanimously convinced of Bauereisen's guilt, there being no division on this question except on the first ballot, when the poll was eight to four for conviction. On the second ballot all voted for conviction, and then came the question of determining the extent of the punishment. In the first ballot on this question eight jurymen voted for five years in the penitentiary, and four, thinking of the disgrace, voted for a fine in place of imprisonment. A compromise was finally made on two years. These figures show that there was hardly a shadow of a chance from the start, after the jury received the case, for Bauereisen to escape conviction. Motion was made for a new trial, upon grounds not stated, and this motion will be heard Jan. 3. After this conviction in fair, open trial, with ample time for preparation by the defence, there will be considerable curiosity to see what the Brotherhood will do about the matter. Arthur has said, in effect, that these Burlington dynamiters, if guilty, must leave the Brotherhood. The Brotherhood has already expelled one member who denounced the methods of the conspirators, but whether this convicted chief of the conspirators will be expelled remains to be seen.—*Railway Review*

Strikes.

The 75 switchmen in the yard of the Lake Erie & Western, at Lima, O., struck last Monday, and blocked freight traffic for a day or two. They "would not allow trains to be made up nor permit through trains to change engines" says a despatch. On Wednesday the despatches stated that the men had returned to work at an advance of 15 cents a day.

The yard switchmen of the Union Pacific in Denver, Colo., to the number of 70, struck on Dec. 20, demanding increased pay, two more crews, and the transfer of authority over the yard from the local agent to an independent yard master. It is stated that the company acceded to the last two demands, but would not raise the pay. The company secured 15 or 20 new men within three days, and within a week the strikers seemed to be pretty completely beaten, though many smelters and other large consumers of coal and coke, located on Union Pacific side tracks, were beginning to complain of a scarcity of fuel. The police had to be called in and officers were sent out with trains, but in spite of this there was some lawlessness, trains being uncoupled. Among the statements published for the purpose of enlisting the sympathy of the public with the strikers are explanations, with diagrams, of the complicated rails and frogs at a combined narrow gauge and standard gauge three-throw switch, and of the dangerous work required in coupling narrow and standard gauge cars in the same train. It is claimed that this is habitually done with cars whose dead blocks are so far apart as to afford no protection whatever.

Very Free Passes.

The *Railway Age* gives the following illustrations of sublime assurance, brought to the surface by the return of the season for reissuing annual passes:

"GENERAL MANAGER'S OFFICE,
"CADY MILLS RAILWAY CO.
"MINNEAPOLIS, MINN., Dec. 31, 1888.

"DEAR SIR: I respectfully request annual exchange passes for the year 1889 for the following officers of this railway:

"D. C. Davis, President; Charles Oliver, General Manager; S. H. Davis, General Freight Agent; B. W. Ball, Solicitor and Counselor; Charles C. Stetson, General Passenger Agent.

"I shall be pleased to respond to similar request from you.

"Yours truly, CHARLES OLIVER,
"General Manager."

"This company, with its imposing list of officials, owns a sour track running to a sawmill in Minneapolis. * * We have received the exchange pass circular of a little seven-mile road in Georgia which presents a list of four officers for whom annuals are requested for 1889. It appears that the superintendent of this road, who is also secretary and treasurer of the company, is furthermore agent of a patent medicine which is warranted to 'protect health, make life worth living and be a source of constant pleasure' It is evident that passes over all the railways in the United States would come in very handy in connection with the beneficent business with which the superintendent, secretary and treasurer is identified. The road referred to owns one engine and one passenger car and leases one box and one platform car and earns nearly $8,000 a year. While the enterprise is a legitimate one, it would seem that its proprietors should be somewhat modest in their requests for transportation."

Life on the Panama Railroad.

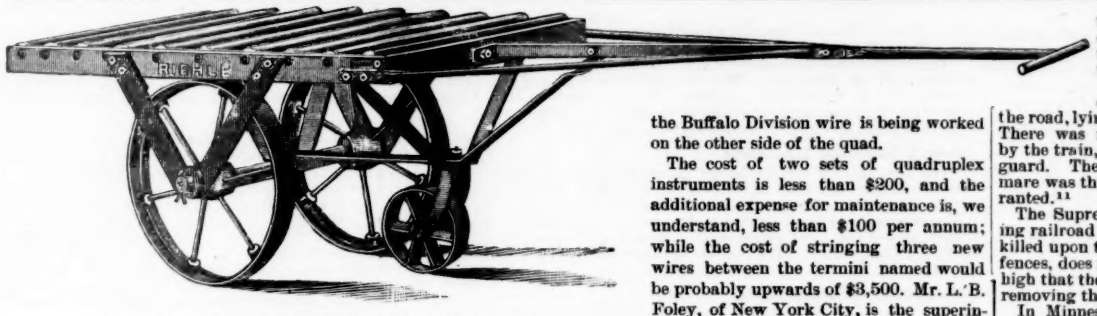
A correspondent of the Topeka (Kan.) *Commonwealth* reports the following interview with a conductor on the Panama road now visiting that city: "I run a through freight from Aspinwall to Panama. There are 31 stations on this road and 270 miles of sidetracks and spurs that belong to the canal company. There are 16 regular trains and many extras and specials on this 47 miles of single track, and all run between 6 a. m. and 6 p. m. It takes rustling to get over the road on time, it is so crooked, and trains of 15 to 90 cars are hauled. For about six miles of the way 15 cars are enough for each engine; the rest of the way we can pull as many cars as we can couple to. There are 8 passenger trains and 8 freights, 2 of these passengers being mixed and hauling the local freight. There are two conductors, one man to check freight and 12 negro brakemen to handle freight. The regular through passenger train has a conductor for each second class car. The man in charge of running the trains runs two first-class cars, but the travel is nearly all second class, as the people there are most all negroes and Chinamen. The canal men are paid every two weeks, on Sunday, and that is what makes so much travel, while the stations are so close together that it is all one can do to get through one car before stopping at the next station. The Sunday before I left was pay day, and there were seven conductors on each of the two trains each way, each conductor collecting over 200 tickets beside the cash fares. You wouldn't believe the amount of business done on this little road. There is also a special car run over the road each day to carry the dead and wounded, as well as a special train out of Aspinwall daily at 5 p. m. to the graveyard. I never saw so many dead people in my life as I did while in Panama. We have small pox, yellow jack and cholera, while not a single day passes without two to six people being killed by the cars. They pay no more attention to killing a man there than people in the states would a dog. Conductors receive $175 per month in American gold, and have a well furnished room at each end of the route. Board and washing cost $40 a month. I liked it better every day, as I got used to the country and to seeing the dead train. That train made my hair stand on end at first, but I finally grew as tough as any of them. Yes, I am going back in about a month."

Snow Slides on the Canadian Pacific.

Three heavy snow slides on the Canadian Pacific occurred in the mountains week before last. The first came down on Monday near Field, burying the track from 7 to 12 ft. deep for a distance of 70 ft. The track was cleared by the big snow plow. On Wednesday night the second slide came down, after the passenger train going east had passed the spot about 10 car lengths. On Thursday the biggest slide of all occurred, covering the track to a depth of 15 ft., narrowly missing a freight train which was coming down the hill. There has been no loss of life, but several narrow escapes are reported.—*Northwestern Railroader.*

Fighting a Railroad with a Red-handled Axe.

Mayor Gleason, of Long Island City, N. Y., has renewed the attack on the Long Island Railroad Co., which was begun last July. He had given the company notice to remove a fence, track and other obstructions on Front street, and had given two extensions of time after the expiration of 90 days, within which the impediments to street traffic were to be removed. The company failed to act, and at 10 o'clock on the morning of Dec. 27 the Mayor took upon himself the enforcement of the disregarded order, with 50 men. The first charge was made on a high fence, and Mayor Gleason struck the initiatory blow with a handsome red-handled axe. The fence was leveled, and then the work



RIEHLE'S SLAB TRUCK FOR ROLLING MILLS.

upon the tracks began. To prevent tearing up the rails the company ran a freight train on the track, and for a time the mayor was blocked. He ordered the trainmen to run the train back, and on their refusal had them arrested. He then sent for the man who runs his fire engine, and was giving him orders to run the locomotive and cars out on the main track, when the company's men, cutting the engine loose from the cars, ran her away. The mayor, however, was equal to the emergency, for he had men enough to move the cars away one by one, after which the tracks were torn up. So far, in the war between the mayor and the railroad company, the former has been victorious, but the road will try to show that the mayor's acts are in contempt of court.

Burning of the Steamer "Bristol."

The sound steamer "Bristol," of the Old Colony Steamboat Co. (Fall River Line), was burned at her dock at Newport, R. I., on the morning of Dec. 30, after the passengers had disembarked and the freight had been unloaded. The flames apparently started in the kitchen and spread so rapidly that the men lost their personal effects. The steamer "Pilgrim" was lying near by and was barely saved. The "Bristol" was built by William H. Webb, and went into service in 1867. She cost $1,250,000, and soon passed into the hands of the Narragansett Steamship Co., which was sold out to the Old Colony Railroad in 1874. She was 373 ft. long and 83 ft. beam.

Boston Idiom.

What there is left of the Inter-state Commerce law is going to be amended, and the defects, well, they will Cullom out, as it were.—*Pathfinder.*

A New Fashion in Passenger Agents.

A newspaper correspondent at Huron, Dakota, states that the Chicago, Milwaukee & St. Paul is sending some of the farmers east to stimulate emigration. The road selects "from two to six intelligent, discreet, ready talkers from each county along the road, gives them transportation back to their former homes in the eastern states and pays their expenses and a reasonable salary. These home-made agents hold school-house meetings where they are known, distribute their circulars, make addresses, telling the straight thing of Dakota; visit from house to house and post their old neighbors," etc.

From the same correspondent we learn that the "straight thing" to be told about Dakota at present is that "no snow, rain, mud, sleet, hail nor wind came till the day before Christmas. * * Farmers plowed until that day. Maj. Ruth, a De Smet banker, had a tree in his yard that budded on the 23d, and peas ready to leaf on the 24th. In Alpena on the 24th the *Journal* says that snakes were running around." And this in defiance of the eternal edict that snakes should crawl on their bellies.

The First Annual Pass.

An article by S. B. Dod, in *Harper's Weekly*, on the Evolution of the Ferryboat, states that the license granted Pieter Hetfelsen by Governor Carteret in 1669, establishing the right to maintain a ferryboat line between New York and Communipaw, contained the clause "always provided the Governor and his family are to be freed from paying anything for their transportation, as aforesaid."

This must be the true record of the great original American deadhead. Let us be thankful that he is not now among his numerous descendants to be saddened by their woes springing from the passage of the Inter-state Commerce Law.

Riehle's Slab Truck for Rolling Mills.

The truck which is shown in the accompanying cut was designed and made by Riehlé Brothers for the Carbon Iron Co., of Pittsburgh. The dimensions of this truck are as follows: Extreme length, 11 ft.; width, 34 in.; height, 27½ in.; weight, 600 lbs.; size of platform, 5 ft. × 2 ft. 6 in.; gauge of wheels, 22 in.; diameter of wheels, 24 in.; tread of wheels, 2 in.; size of axles, 1¾ in.; length of hub, 4 in. The journals have friction rollers and a swivel caster forms the guide or fifth wheel.

The same firm makes a tire truck for the Standard Steel Works at Lewistown, Pa., and pig iron trucks for blast furnaces. Any further information concerning these trucks can be had from the makers, Riehlé Brothers, Philadelphia, Pa.

The Quadruplex System on the D., L. & W. Wires.

The Delaware, Lackawanna & Western road, whose telegraph business is conducted by its own men, wholly independent of the Western Union Company, is using the quadruplex system between Scranton, Pa., and Binghamton, N. Y. This division is in the centre of the company's system, and the wires therefore convey a large number of messages daily. At Scranton the general manager's office and the division freight agent's office have the "quad," and at Binghamton the division dispatcher's office and the freight office use it. On one side the general manager's and the division freight agent's offices work direct with the 20 offices on the Buffalo Division, west of Binghamton, while on the other side the two offices in Scranton work with the two in Binghamton. This side of the quad is arranged so that the two offices at each end can work duplex with each other; that is, can send and receive from each other simultaneously. Any one of the four offices can send and receive at the same time with any other one, or can send to one and receive from another. Many combinations can be worked in this way, while at the same time the Buffalo Division wire is being worked on the other side of the quad.

The cost of two sets of quadruplex instruments is less than $200, and the additional expense for maintenance is, we understand, less than $100 per annum; while the cost of stringing three new wires between the termini named would be probably upwards of $3,500. Mr. L. B. Foley, of New York City, is the superintendent of telegraph of the road.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

In Missouri the Federal Court holds that where a county issues railroad bonds, the coupons thereto attached are subject to the same period of limitation as the bonds, and, that time having elapsed from the date of the maturity of the coupons, they are barred, although not detached from the bonds. Coupons bear interest from the date of their maturity; and in an action thereon in Missouri coupons payable out of the state will be allowed the same rate of interest as those payable in the state, no proof of the rate of interest in the foreign state being offered.[1]

In Kansas the Federal Court rules that the fact that a railroad, heavily mortgaged, has made several defaults in the payment of interest, aggregating over $1,000,000; that the business is decreasing, with probability of further decrease from competition with new lines; that it is in need of repairs and improvements; that the bondholders are not in harmony; that a foreclosure is about to be decreed, and that no other way exists for applying the rents and profits of the road to its debts—are sufficient reasons to justify the appointment of a receiver.[2]

In Alabama the Supreme Court decides that it is within the implied power of a railroad company for the protection of its property to issue a printed circular offering a general standing reward "for the arrest, with proof to convict, any person for the malicious obstruction of" its tracks, and such offer is binding on the company. A railroad superintendent may bind the company by issuing such a circular, though no authority to do so has been granted him by the board of directors, such an act being within the scope of his general duties. Such a circular, when headed with the names of two railroad companies, and signed by their superintendent, is the contract of the companies and not of the superintendent personally. When, in response to a letter sent to a railroad superintendent, such a circular is received through the mail in an official envelope, addressed in the handwriting of the superintendent's secretary, the presumtion is, in the absence of rebutting evidence, that it is an offer made by the superintendent on behalf of the companies. Such an offer applies to the arrest of those who commit the offense either before or after the date of the circular.[3]

The act of Congress of July 2, 1864, organizing the Northern Pacific Railroad Co., and granting to it a certain number of alternate sections of land on each side of its line of road, provided that, whenever, prior to the definite location of its line, any of such sections should have been sold or preempted, other lands might be selected in lieu thereof, not more than 10 miles beyond the limits of said alternate sections. A resolution of May 31, 1870, provided that in case there should not be, in any state or territory, at the time of the final location of the road, "the amount of lands per mile granted by Congress to said company, within the limits prescribed by its charter," the company should be entitled to receive so many alternate sections of land "in such state or territory, within 10 miles on each side of the said road beyond the limits prescribed in said charter, as will make up such deficiency * * * to the amount of the lands that have been granted," etc., "subsequent to the passage of the act of July 2, 1864." The Federal Court in Minnesota holds that the resolution gave the company an additional 10-mile indemnity limit, and was not intended merely to restrict indemnity to losses occurring subsequent to the original act, and to lands situated in the state or territory in which such losses occurred.[4]

The Supreme Court of Arizona decides that the exemption of a right of way from taxation does not exempt the superstructure, *i. e.*, a railway, thereon. Taxation of the franchise of a railway granted by act of congress, by the territories, is not in conflict with the constitutional grant to congress of the power to regulate commerce among the several states. Nor is the taxation by a territory of the franchise of a corporation incorporated by act of congress unconstitutional, as the taxation of a federal agency, in the absence of such restriction in the grant of the taxing power to the territory, as congress may permit the territory to do so. For the purposes of taxation, the *situs* of the rolling stock of a railway company is where it is habitually used. If the specified property be constantly changing, the amount may be fixed by the average amount so used.[5]

In Iowa the Supreme Court rules that under the code of that state, by which, if a right of way shall not be used or operated for a period of eight years, the land shall revert, a re-entry within the eight years by a railroad company upon its right of way, for the purpose of rebuilding its road, is not a trespass.[6]

Carriage of Goods and Injuries to Property.

In Georgia the Supreme Court holds that where by the terms of the bill of lading the goods are consigned to the order of the consignor, and the bill is indorsed in blank, and negotiated for the value as security for a draft drawn by the consignor on a third person, the carrier has no right to deliver the goods to such third person without production of the bill of lading, or authority from the holder thereof.[7]

In South Carolina the Supreme Court holds that a railroad is bound to carry the goods of any person offering them, and that where it refuses out of ill will or through a willful disregard of the person's rights, it is liable to exemplary damages. But a charge that a railway company must as a common carrier transport goods over a branch road in use by it, whether owned or operated under a contract or lease, is erroneous, in that such liability does not depend on the mere fact of use, but on the object and purpose of the construction and the character of the use.[8]

In Georgia the Supreme Court decide that a railroad is not liable for losses caused by delayed freights, where the cause of the delay was an organized strike and resistance, which neither the railroad company nor the civil authorities, which were called upon, could control.[9]

In the same state the same court hold that the drawee of a draft, to which was attached a bill of lading, in order to recover of the carrier for loss caused by delay, must show that the amount of the draft was greater than the sum actually realized on the shipment. A consignee of freight cannot sue the carrier for loss caused by delay, where the consignor made the contract of carriage, unless the bill of lading has been assigned or indorsed to him by the consignor.[10]

In Iowa a mare alleged to have been killed by defendant's train was found in a cattle-guard of the road, lying partly on her back, with her feet elevated. There was no direct evidence that the mare was struck by the train, or was frightened by it, and ran into the cattle guard. The Supreme Court holds that a finding that the mare was thrown into the guard by the train was not warranted.[11]

The Supreme Court of Iowa holds that the statute making railroad companies liable in double damages for stock killed upon their tracks in cases of failure to erect proper fences, does not impose on them the duty to build fences so high that they will never be covered with snow, nor that of removing the snow and drifts from the fences.[12]

In Minnesota the Supreme Court holds that whenever, without his consent and without compensation to him, a railroad is laid and operated along the portion of the street in front of his lot, so as to cause smoke, dust, cinders, etc., to come upon the lot, the lot-owner may recover whatever damages to his lot are caused.[13]

In New Hampshire it is held by the Supreme Court that a railroad corporation is liable, under the statute, for the destruction by fire from a locomotive of wood, coal, etc., deposited on land adjoining its line, and there used by a dealer as his stock in trade.[14]

Injuries to Passengers, Employes and Strangers.

In Texas a passenger purchased tickets from defendant's agent as first class, but when presented to the conductor it was discovered that they were second class, and plaintiff was removed from the first-class car. The Supreme Court holds that this right of action was not affected by the conductor's offer to let him remain if he would pay one cent a mile in addition to what he had paid for his tickets, or by the rule of defendant that the conductor could only look to the ticket, and had no right to inquire if plaintiff was entitled to a first-class passage. In this case the plaintiff's wife was with him, and was also compelled to go into the second-class car. The jury give the plaintiff $500 extra damages for this indignity. The Supreme Court affirms, saying: Had the appellee and his wife been entitled to passage in only a second-class car, we do not understand that the appellant would not then have been compelled to exercise due care to protect them from discomforts resulting from the acts of other passengers, and not incident to the kind of car used for passengers of that class, whether those discomforts were physical or mental. The record shows that the wife of appellee was compelled to ride in a car full of tobacco smoke, which caused nausea; that she was compelled to ride where she could not avoid hearing rough, profane and obscene language, and witness acts of violence and drunkenness. These things carriers of passengers ought not to permit in vehicles in which they undertake to transport decent men; much less, refined and delicate women.[15]

In Georgia a passenger had been in the habit of carrying in his trunk, and having checked free of charge, articles of merchandise, contrary to the rules of the company. The passenger, after the railroad had discovered his violation of its rules, brought his trunk with nothing in it but some old articles of dirty wearing apparel to be checked for the purpose of having the railroad refuse, unless he should sign an affidavit as to its contents, which he had determined not to do, and thus lay the foundation of an action for damages. The Supreme Court rules that the passenger could not question the reasonableness of the requirement as to signing the affidavit.[16]

In Iowa an employé while inspecting the wheels of a car was injured by the train starting, the signal to start having been given by an unauthorized person. The Court instructed the jury that the defendant was not responsible for the act of persons not in its employ, or under its control, thus withdrawing from the jury the question of negligence, based on the signal to back given by unknown persons; but further directed them to consider evidence of such acts as explanatory of the manner in which the train was moved. The Supreme Court holds that the evidence was incompetent for any purpose, since the signal, by whoever given, was not the proximate cause of the injury, the material question being whether the train was moved in a proper manner, and at a proper time.[17]

In Texas an action for the death of a person by being thrown from his wagon, his horses taking fright at a hand car and a pile of ties on either side of a railroad crossing, was brought under a statute providing for an action "when the death of any person is caused by the negligence or carelessness of the proprietor, etc., of any railroad, * * * or by the unfitness or gross negligence or carelessness of their servants." The evidence showed that the ties and hand car were placed there by defendant's fencing gang. The Supreme Court holds that to make the company liable the plaintiff must prove "gross negligence," and that the fact that horses had often been frightened by the same objects, and that defendant had allowed them to remain there long afterwards, does not prove gross negligence *per se*, but is a fact to be considered by the jury.

In South Carolina the Supreme Court rules that when a parent is killed the children may recover damages without showing that they were damaged pecuniarily or had any legal claim on him for support, and that funeral expenses may be recovered.[18]

[1] Huey v. Macon Co., 35 Fed. Rep., 481.
[2] Mer. Trust Co. v. M., K. & T. R. Co., 36 Fed. Rep., 221.
[3] Cent. R. & B. Co. v. Cheatham, 4 South. Rep., 828.
[4] N. P. R. Co. v. U. S., 36 Fed. Rep., 282.
[5] A. & P. R. Co. v. Lesueur, 19 Pac. Rep., 157.
[6] Fernow vs. C., M. & St. P. R. Co., 39 N. W. Rep., 867.
[7] Boatman's Sav. Bk. v. W. & A. R. Co., 7 S. E. Rep., 125.
[8] Avinger v. S. C. R. Co., 7 S. E. Rep., 493.
[9] Haas v. K. C., F. S. & G. R. Co., 7 S. E. Rep., 629.
[10] Haas v. R. Co., *supra.*
[11] Brockert v. Cent. Iowa R. Co., 39 N. W. Rep., 871.
[12] Patten v. C., M. & St. P. R. Co., 39 N. W. Rep., 708.
[13] Adams v. C., B. & N. R. Co., 39 N. W. Rep., 629.
[14] Hazeltine v. Concord R. Co., 6 N. Eng. Rep., 897.
[15] St. L., A. & T. R. Co. v. Mackie, 9 S. W. Rep., 451.
[16] N. & W. R. Co. v. Irvine, 7 S. E. Rep., 233.
[17] Gadbois v. C., M. & St. P. R. Co., 39 N. W. Rep., 873.
[18] Mo. Pac. R. Co. v. Hill, 9 S. W. Rep., 351.
[19] Petrie v. C. & S. R. Co., 7 S. E. Rep., 515.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Beech Creek, 2½ per cent. on the preferred stock, payable Jan. 15.

Canada Southern, 1¼ per cent., payable Feb. 15.

Cheshire, 3 per cent. on the preferred stock, payable Jan. 10.

Cleveland, Columbus, Cincinnati & Indianapolis, 1¼ per cent., payable Feb. 15.

Delaware, Lackawanna & Western, quarterly, 1¾ per cent., payable Jan. 21.

Georgia Railroad & Banking Co., 2¾ per cent., payable Jan. 15.
Lake Shore & Michigan Southern, quarterly, 2 per cent., and an extra 1 per cent., both payable Feb. 15.
Michigan Central, 2 per cent., payable Feb. 15.
New London Northern, 1¾ per cent., payable Jan. 2.
Northeastern (South Carolina), 3 per cent., payable Jan. 5.
Paterson & Hudson, 4 per cent., payable Jan. 3.
Paterson & Ramapo, 4 per cent., payable Jan. 3.
Petersburg, 2 per cent., payable Jan. 1.
Portsmouth & Dover, 3 per cent., payable Jan. 1.
Providence & Worcester, quarterly, 2½ per cent., payable Dec. 31.
Rock Island & Peoria, 2½ per cent., payable Jan. 1.
Rutland, 50c., payable Jan. 1.
Vermont Valley, 3 per cent., payable Jan. 1.
Wilmington, Columbia & Augusta, 3 per cent., payable Jan 10.
Wilmington & Weldon, 4 per cent., payable Jan. 15.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:
Carthage & Adirondack, special meeting, 160 Broadway, New York, Jan. 23.
Knoxville & Ohio, annual meeting, Knoxville, Tenn., Jan. 21, to consider the question of approving the lease of the Knoxville & Ohio to the East Tennessee, Virginia & Georgia, heretofore made in accordance with resolutions adopted by the board of directors.
Lehigh Valley, annual meeting, Philadelphia, Jan. 15.
Loyalsock, annual meeting, Philadelphia, Jan. 14.
Mine Hill & Schuylkill Haven, annual meeting, Philadelphia, Jan. 14.
Montpelier & White River, annual meeting, Barre, Vt., Jan. 10.
Morris County, annual meeting, Paterson, N. J., Jan. 7.
New York, Ontario & Western, annual meeting, 16 Exchange Place, New York, Jan. 16.
North Pennsylvania, annual meeting, Philadelphia, Jan. 14.
Pennsylvania & New York Canal & Railroad Co., annual meeting, Philadelphia, Jan. 14.
Philadelphia & Reading, annual meeting, Philadelphia, Pa., Jan. 14.
Pittsburgh & Lake Erie, annual meeting, Pittsburgh, Pa., Jan. 22.
Western New York & Pennsylvania, annual meeting, Philadelphia, Jan. 14.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:
The Association of American Railway Accounting Officers meets at the Southern Hotel, St. Louis, Mo., Jan. 24, 1889.
The *American Association of Railway Chemists* will hold its next meeting in Baltimore, Md., Jan. 14, 15 and 16.
The *National Association of Railway Surgeons* holds its annual convention in St Louis, Mo., May 2, 1889.
The *New England Railroad Club* meets at its rooms in the Boston & Albany passenger station, Boston, on the second Wednesday of each month.
The *Western Railway Club* holds regular meetings on the third Tuesday in each month at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m.
The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.
The *Central Railway Club* meets at the Tifft House, Buffalo, the fourth Wednesday of January, March, May, August and October.
The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month at the House of the Society, 127 East Twenty-third street New York.
The *Boston Society of Civil Engineers* holds its regular meetings at its rooms in the Boston & Albany station, Boston, at 7:30 p. m. on the third Wednesday in each month.
The *Western Society of Engineers* holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.
The *Engineers' Club of St. Louis* holds regular meetings in St. Louis on the first and third Wednesdays in each month.
The *Engineers' Club of Philadelphia* holds regular meetings at the house of the Club, 1,122 Gerard street, Philadelphia.
The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7.30 p. m. at its rooms in the Penn Building, Pittsburgh, Pa.
The *Engineers' Club of Kansas City* meets at Kansas City, Mo., on the first Monday in each month.
The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.
The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7.30 p. m. on the third Saturday in each month.

American Society of Civil Engine rs.

A regular meeting was held Jan. 2. Papers on High Masonry Dams, previously presented, were discussed. Written discussions by Messrs. E. Sherman Gould, John W. Hill, G. Bouscaren, E. A. Fuertes and J. B. Francis were presented and there was considerable verbal discussion by members present.

Boston Society of Civil Engineers.

A regular meeting was held Dec. 19, 53 members and 11 visitors being present. Messrs. Henry F. Bryant, Levi G. Hawks and George A. King were elected members. The secretary was instructed to convey to the president of the West End Street Railway Co. and to the Sprague Electric Motor Co. the thanks of the society for courtesies received on the occasion of a trip over the electric railroad line in Brookline and Brighton. A committee was appointed to confer with the officers of other engineering or scientific societies in Boston for the purpose of ascertaining what steps can be taken toward joint quarters for such societies.
Mr. John B. Freeman read a paper on Stadia Work, and Mr. Henry D. Wood described the work accomplished with the stadia on the Mississippi River survey. Mr. William E. McClintock compared the work of the plane table with that of the stadia, strongly favoring the former, and the two methods of surveying were discuss d.

Engineers' Club of Philadelphia.

A regular meeting was held Dec. 15, 1888, Vice-President John T. Boyd in the chair; 31 members present.
The Secretary presented, for Mr. J. Milton Titlow, some historical particulars with regard to the old Market Street Bridge, Philadelphia, with an electrotype of the copper plate found at low water level in the middle of the east pier, when it was taken down to be rebuilt above low water for the present iron cantilever bridge.
Mr. F. J. Amweg exhibited photographs of the piers when the rebuilding was being started, and gave some account of the substantial character of the old work, etc.
Mr. Arthur Marichal presented, as a discussion of Prof. L. M. Haupt's recent paper on the Plans for the Proposed Improvement of the Bar at the Entrance to the Rio Grande do Sul, Brazil, a description of the Improvements of the Harbor of Libau, Russia.
There was some discussion by Prof. L. M. Haupt.
Prof. H. W. Spangler, Mr. Arthur Marichal and the author, Mr. J. E. Codman, continued the discussion of Indicator Cards from Compound Engines Showing Expansion through High and Low Pressure Cylinders.

New York Stock Exchange.

The governors of the Exchange have listed the following new securities: $144,000 additional consolidated first mortgage 6 per cent. gold bonds of the Milwaukee, Lake Shore & Western, making $4,674,000 listed to date; $4,508,000 first-mortgage 5 per cent. guaranteed sinking fund bonds of the Union Pacific, Lincoln & Colorado guaranteed by the Union Pacific.

Northwest Railroad Club.

The next meeting of the club will be held in the Union Depot, St. Paul, at 7.30 p. m. Saturday, Jan. 5, 1889. The subject for discussion will be "Snow Plows and Flangers; the Best Form and Manner for Applying and Operating." Introduced by Mr. C. F. Ward, master mechanic, St. Paul & Duluth.

Ohio Institute of Mining Engineers.

The ninth annual meeting of the Ohio Institute of Mining Engineers will be held at Lyndon Hall, southeast corner Fourth and Long streets, Columbus, Ohio, beginning Jan. 10, 1889. The following is the programme, arranged according to standard time:
Thursday, Jan. 10, 7 *p. m.*—Paper—Vessel Loading by Machinery, by W. B. Hanlon. Paper—Miners' Hospitals, by Hon. Andrew Roy. Paper—Review of the Westward Extension of the Hocking Valley Coal Field, by Prof. Edward Orton.
Friday, Jan. 11, 9 *a. m.*—Business Session. Paper, by Hon. R. M. Haseltine. Paper—Spring Pole Drilling, by Hon. Anthony Howells. Paper—Coal and Clay of Muskingum County, by Benjamin Wheeler. 1:30 p. m., Paper—Mine Surveying, by F. A. Ray. Paper—Experiments in Blasting, by W. B. Brooks, Jr. Paper—Mining and R. R. Engineering, by F. J. Aid. Paper— by Prof. N. W. Lord. 7 p. m., Paper—Electricity in Mining, by C. W. Jenks, of the Mining Department of the Sprague Electric Motor Co.

New England Railroad Club.

The regular monthly meeting of the club will be held at its rooms in the Boston & Albany passenger station, in Boston, on Wednesday, Jan. 9, at 7.30 p. m. The subject for discussion is "The Metric System of Weights and Measurements as Applied to Railway Service." The discussion is to be opened by George Richards.

PERSONAL.

—Mr. J. W. Cloud, Superintendent of Motive Power, New York, Lake Erie & Western, has resigned.

—Mr. W. F. Johnson, Car Accountant of the Cairo & Vincennes road, died recently after a brief illness.

—Mr. H. D. McLeod, Superintendent of the Southern division of the New Brunswick road, has resigned.

—Col. G. T. M. Davis, Secretary of the Oregon Pacific, and at one time Secretary of the Iowa Central, died in New York recently.

—Mr. W. T. Bailey has resigned the position which he has so acceptably filled as "compiler" of the Central Traffic Association, Passenger Department.

—A. P. Hall, Assistant Superintendent at Pueblo of the Atchison, Topeka & Santa Fe, has been appointed Freight Agent in Denver, the former office being abolished.

—Mr. C. J. Allison has resigned his position as Chief Engineer of the Nashville & Knoxville, to become General Manager of a newly organized Southern construction company.

—Mr. J. H. Vreeland, Master Mechanic of the Eastern division New York, Lake Erie & Western, has, after a service covering a long term of years, retired from the employ of the company.

—Mr. Walter A. Jones, one of the proprietors of the Jones Car Works, of West Troy, died of consumption, Jan. 2, at Saranac Lake, N. Y. Mr. Jones has been prominently connected with several street railroads throughout the country.

—George S. Russell, Assistant Treasurer, has been elected Treasurer of the Cleveland, Columbus, Cincinnati & Indianapolis, vice George H. Russell, deceased. J. T. Wann has been elected Secretary. The offices have hitherto been combined.

—Mr. C. R. Barnhart, formerly Superintendent of the Louisville, Cincinnati & Lexington division of the Louisville & Nashville, and more recently General Master of Transportation of the Central of Georgia, has been made Master of Transportation of the Evansville & Terre Haute.

—Mr. John R. Kenly, Superintendent of Transportation of the companies comprising the Atlantic Coast line system, has been appointed Assistant General Manager. In 1868 he was appointed Resident Engineer on the Pittsburgh & Connellsville road and held the position for three years. At the end of that time he took a similar position on the Union road at Baltimore, with which company he remained for 10 years. In 1882 he was appointed Superintendent of the Richmond & Petersburg, and in 1885 he became Superintendent of Transportation of the Atlantic Coast Line.

—Mr. J. G. Metcalfe, who succeeds Mr. J. T. Harahan as General Manager of the Louisville & Nashville, is 43 years old, and has been connected with the road since 1866, when he entered the office of General Superintendent D. W. C. Rowland, at Louisville, Ky. He remained there but a short time as Chief Train Dispatcher, when he was promoted to be Superintendent of the Louisville, Cincinnati & Lexington Division. He remained in this capacity until 1884, when he was transferred to be Superintendent of the Henderson & St. Louis Division at Evansville, Ind., which place he held until Sept. 1 last, when he was promoted to be Superintendent of the South and North and Birmingham Mineral Divisions, at Birmingham, Ala. This position he held when he was appointed General Manager.

ELECTIONS AND APPOINTMENTS.

Atlantic Coast Line.—J. R. Kenly has been appointed Assistant General Manager of all roads composing the Atlantic Coast Line, and assumed the duties of his office Jan. 1. General superintendents are to report directly to him. His headquarters will be at Wilmington, N. C.

Boston & Lowell.—The annual meeting of the stockholders was held in Boston Jan. 2. The following directors were elected: T. Jefferson Coolidge, W. Powell Mason, Edwin Morey, F. E. Clarke, William A. Haskell, Francis L. Higginson, George A. Gardner. The latter succeeds D. Cochrane.

Boston & Maine.—The stockholders of the company met in special session at Lawrence, Mass., Jan. 2. William T. Hart, of Boston, was elected a director to fill the vacancy caused by the death of N. J. Bradlee. C. E. Bartlett, of Boston, was appointed to approve the future issues of bonds.

Chicago, Burlington & Quincy.—A number of changes have been announced: E. R. Puffer has been appointed Assistant General Freight Agent, succeeding C. G. Wilson, who is now Superintendent of Terminal Facilities. C. A. Johnson is appointed Division Freight Agent of the Chicago Division with office at Chicago, to succeed E. R. Puffer. W. A. Gibson succeeds C. A. Johnson as Freight Solicitor. P. Y. Griggs has been appointed Traveling Freight Agent at Buffalo, in place of George A. Cowan, resigned. H. T. Keenan has been appointed General Agent, with headquarters at Fort Worth, Tex. William Austin has been appointed Traveling Freight Agent in Michigan, vice P. Y. Griggs, promoted; office, Chicago.

Cincinnati, New Orleans & Texas Pacific.—D. G. Edwards, heretofore Acting General Passenger Agent, has been appointed General Passenger and Ticket Agent.

Cleveland, Columbus, Cincinnati & Indianapolis.—George S. Russell has been appointed Treasurer, vice George H. Russell, deceased, and J. T. Wann has been appointed Secretary.

Cleveland & Pittsburgh.—The annual meeting of the road was held at Cleveland Jan. 2, and the stockholders re-elected the old board of directors: J. N. McCullough, B. F. Jones, George B. Roberts, William Bucknell, Charles Lanier, William C. Eggleston, E. A. Ferguson, J. V. Painter, E. R. Perking, R. P. Rarney, R. F. Smith, W. W. Holloway.

Columbus & Eastern.—At a meeting of the directors of the company in Columbus, O., Dec. 28, the resignations of Granville P. Hawes, H. W. Cannon and F. H. Platt were accepted. The vacancies were filled by the election of D. S. Gray, Charles Parroot and P. W. Huntington, of Columbus. Mr. Hawes resigned the Presidency, being succeeded by Mr. Gray. The other directors elected are W. E. Guerin, F. J. Pickard, H. D. Turney and G. C. Hoover, Mr. Pickard being the Vice-President and General Manager.

Danville, Chicago & Northwestern.—Gen. John McNulta, K. H. Wade, George W. Stevens, John M Osborn, of the Wabash, and Malcolm A. McDonald, of the Cairo, Vincennes & Chicago, are the incorporators, and compose the Board of Directors of this Illinois company.

Dayton & Union.—The stockholders at the annual meeting have elected the following directors: Julius Dexter, C. C. Waite, Eugene E. Zimmerman, W. Ramsay, J. H. Lyng, G. M. Beach, H. H. Poppleton, G. T. Russell and R. D. Marshall. The Board will organize at Cincinnati Jan. 23.

Evansville & Terre Haute.—C. R. Barnhart has been appointed Master of Transportation, with office at Evansville, Ind.

Florida Southern.—Under the lease to the Jacksonville, Tampa & Key West, the following officers have been appointed: Sherman Conant will remain as General Manager and will take charge of the operation of its lines. J. G. Kennedy has been appointed General Auditor; J. A. Lernerd, General Freight Agent; L. E. Barker, Assistant General Freight Agent; G. D. Ackerly, General Passenger Agent, and J. R. Parrott, General Attorney.

Hawesville & Pellsville Mineral.—D. L. Adair is President, Robert Winn is Secretary of this proposed Kentucky line.

International & Great Northern.—M. M. McDonough, formerly Division Roadmaster of the New Orleans division of the Texas & Pacific, has been appointed General Roadmaster of this road with office at Palestine Tex.

Jacksonville, St. Augustine & Halifax River.—This company will hereafter operate the lines of the St. Johns, St. Augustine & Halifax River (recently the St. Augustine & Palatka), and the St. Johns & Halifax River roads, and the following appointments have been announced: J. H. Kennedy has been appointed General Auditor; W. L. Crawford, Superintendent; W. J. Jarvis, General Freight Agent, and G. D. Ackerly, General Passenger Agent.

Lake Erie & Western.—F. X. Galarneau, for the past ten years Roadmaster at Lima, O., has resigned, and is succeeded by John Steiner.

Louisville & Nashville.—J. G. Metcalfe has been appointed General Manager, vice J. T. Harahan, resigned, and W. M. Newbold has been appointed Superintendent of the South & North Alabama and Birmingham Mineral divisions, vice J. G. Metcalfe, appointments effective Jan. 1, 1889.

Louisville, New Albany & Chicago.—The title of H. A. Hathaway, District Passenger Agent at Louisville, Ky., has been changed to Southern Passenger Agent, and his territory increased to include the Louisville Southern road.

Louisville Southern.—A. V. Lafayette, General Freight and Passenger Agent, has been relieved of so much of his duties as pertain to the passenger department. All correspondence relative to passenger traffic should be addressed to E. O. McCormick, General Passenger Agent, Chicago.

Maryland Central.—The company has been reorganized with John K. Cowen, George C. Jenkins, W. B. Jones, George S. Brown, William Gilmore of Baltimore, and J. H. Miller and M. H. Housanan of Pittsburgh as Directors, and William Gilmore as President.

Montana Union.—H. S. Wakeman has been appointed Assistant Superintendent of the line, with headquarters at South Butte, Mont.

Mount Carbon & Port Carbon.—At the annual meetings of the combined Mount Carbon & Port Carbon, Mill Creek & Mine Hill, and Schuylkill Navigation companies; held in Philadelphia, Pa., the following officers were elected to serve for all three roads for the coming year: President, Austin Corbin; Managers, A. J. Antelo, Samuel R. Shipley, Thomas Cochran, A. A. McLeod, A. P. Collis and William R. Taylor. P. C. Hollis was made Secretary and Treasurer.

Nashville, Chattanooga & St. Louis.—W. T. Rogers has been appointed Traveling Passenger Agent, with charge of the passenger business of the road in North Alabama, North Georgia, East Tennessee, western North Carolina and Virginia.

New York, Lake Erie & Western.—J. H. Murphy has been appointed Master Mechanic of the Buffalo Division, with office at Buffalo, N. Y., vice Wm. Litz.

New York, New Haven & Hartford.—At a meeting of the directors last week, the following officers were re-elected: President, Charles P. Clarke; Vice-President, E. M. Reed Treasurer, W. L. Squire, and Secretary, W. D. Bishop.

Oregon & Washington Territory.—W. F. Wamsley has been appointed General Manager of this company, with headquarters at Walla Walla, W. T.

Richmond & Danville.—This company having leased the railway and properties of the Georgia Pacific, and the trans-

fer having been made, the Georgia Pacific will hereafter be operated by the Richmond & Danville as lessee thereof.

Mr. John W. Johnston has been elected Fourth Vice-President of the company, and is to be especially charged with the supervision and direction of the extension and construction of new lines of the Georgia Pacific Division. His office will be at Birmingham, Ala.

I. Y. Sage has been appointed General Superintendent and Engineer, in charge of operation and maintenance of property and equipment, and will report to the General Manager. Lewis D. Aylett has been appointed Assistant Treasurer, and will report to J. W. Hall, Treasurer, Washington, D. C. Jas. E. Starke has been appointed Assistant Auditor, and will report to C. M. Crump, Auditor, Washington, D. C., with offices at Birmingham, Ala.

St. Joseph & Grand Island.—Mr. Edwin McNeill has been appointed General Manager of the company and its operative lines, vice G. M. Cumming, resigned.

San Diego, Cuyahoga & Eastern.—G. W. Schnellbacher is General Manager of this California road, and B. R. Whitney is Chief Engineer. The general office is in San Diego, Cal.

San Francisco & North Pacific.—Mr. John Dougherty, lately connected with the Western New York & Pennsylvania, has accepted the position of Vice-President and General Manager of the San Francisco & North Pacific and Sonoma Valley roads, with office in San Francisco.

Savannah, Florida & Western.—Mr. C. O. Haines has been appointed Purchasing Agent, with office at Savannah, Ga., relieving the Assistant Superintendent, who has heretofore performed these duties.

Wabash.—A. D. Dwelle has been sappointed Assistant General Passenger and Ticket Agent, appointment to take effect from Jan. 1, 1889.

Woodruff Sleeping & Parlor Coach Co.—The following appointments have been made: E. J. Westlake has been appointed Superintendent of the Eastern Division, with headquarters at Jersey City, N. J. T. N. Bently has been appointed Assistant Superintendent of the Long Island District, with headquarters at Long Island City. W. A. Wiener has been appointed Assistant Superintendent of the Jersey Central District, with headquarters at Jersey City, N. J.

OLD AND NEW ROADS.

Barre, (Vermont).—This road, construction on which was commenced the last summer, is now practically completed and open for traffic the greater portion of its length, extending from a point below Barre village to the granite quarries above. It will have when completed about 13½ miles of main line and side tracks. On the greater portion of the road the grade is 264 ft. per mile, the line rising 875 ft. in a little less than four miles. This 5 per cent. grade is uniform, with the exception of a short distance on one switchback. The curves are 10° maximum. The road is substantially built, having but one trestle, which is about 400 ft. long. All the box culverts (except one used for a cattle pass) are substantially built of monumental granite. There are two switchbacks, one of which will eventually be reconnected with the main line, forming a loop. The road will open rail communication with some 30 valuable granite quarries, the most of them hitherto inaccessible except by team. At 20 of them the stone can be loaded on the main line with the same derrick that is used to lift it from the quarry.

The construction was done by Ward Bros., of Kennebunk, Me., the location and engineering by Ward Crosby. Connection is made at Barre village with the Central Vermont and at a point about one mile below with the Barre Branch Railroad, now in process of construction and to be completed about Jan. 15. The latter road connects with the Montpelier & Wells River at Barre Junction and is 3.6 miles long. The locomotives are built by Baldwin, logging type, with four and six drivers, equipped with the Westinghouse and LeChatelier brakes. The freight and passenger equipment will be fitted with the Westinghouse automatic brake.

Barre is a thriving village, having increased its population 4,000 since 1880, and now having a population of 6,000. In 1880 there were 60 men at work in the quarries, in 1888 about 1,400. The general offices of the company are at Barre, Vt., with the following officers: A. D. Morse, President; Emory L. Smith, Vice-President; Chas. Currier, Treasurer; A. D. Moore, E. L. Smith, Chas. Currier, John Trow and W. A. Stowell, Directors. F. W. Stanyan has been appointed Acting Superintendent, General Freight and Passenger Agent, and James Boutwell, Assistant Superintendent in charge of road-bed and rolling stock. Mr. Stanyan was formerly Division Agent of the Boston & Lowell, at Fabyan's, N. H., and Mr. Boutwell, an engineer in the employ of the Montpelier & Wells River.

Brookfield.—This company, formed last summer, for the purpose of building a railroad between North Brookfield Station, N. Y., on the Utica branch of the Delaware, Lackawanna & Western, and the new Berlin branch of the New York, Ontario & Western, is in debt to its officers, contractors, and others. The preliminary surveys having been made and the right of way secured, the company began in July last the work of grading and bridging the seven-mile section of the new road between Brookfield and North Brookfield. By the time this work had been nearly completed, in October, the company had exhausted the stock subscriptions, and as it was found impracticable to realize on an issue of mortgage bonds it was compelled to stop construction work.

Camden & Atlantic.—The project of extending the Philadelphia, Marlton & Medford road from Medford to Manahawkin, thence to Long Beach, N. J., is being pushed as rapidly as possible, and most of the right of way has already been secured. When completed the road will be the shortest line from Philadelphia to the Jersey coast.

Canada & St. Louis.—The line has now been completed and put in operation between Battle Creek, Mich., and Goshen, Ind., 68 miles. The road was built by the following companies: Canada & St. Louis, from Goshen, Ind., to Sturgis, Mich., 29 miles; St. Louis, Sturgis & Battle Creek, from Sturgis, Mich., to Battle Creek, Mich., 39 miles, and the Battle Creek & Bay City, from Midland, Mich., to West Bay City, Mich., 18 miles.

The three companies are at present distinct, but will soon be consolidated under the above name. The track above enumerated is all that will be built until next spring, when the line between Bay City and Battle Creek will be completed and an extension to Danville, Ill., probably built.

Cape Fear & Yadkin Valley.—The extension from Fayetteville to Wilmington, 85 miles, has been graded for a distance of 42 miles.

Carthage & Adirondack.—It is stated that the Lehigh Valley has recently purchased a controlling interest in the road, and will extend it to the Little River iron mines, N. Y., where rich magnetic iron ore abounds. The road at present runs from Carthage to Jayville, N. Y., 30 miles. Little River is 14 miles beyond Jayville.

Chattanooga, Rome & Columbus.—Col. J. R. Shaler, late Traffic Manager, has been appointed General Manager.

Chesapeake & Ohio.—The Maysville & Big Sandy road, from Ashland to Covington, Ky., and the bridge between Covington and Cincinnati, were this week turned over by the contractors to this company, and will be operated by it as its Cincinnati division.

Cincinnati & Birmingham.—The promoters of this road have, it is reported, failed to place bonds on the proposed road, and have, therefore, abandoned the project. The road was proposed to extend from Decatur, Ala., to Fayetteville and Shelbyville, Tenn.

Cincinnati, Washington & Baltimore.—Application was made this week before Judge Peck, of the Superior Court, at Cincinnati, for the appointment of a receiver for the road. The Judge appointed Col. Orland Smith, who has been President of the road, and Henry C. Yergason as joint receivers. The petition was filed by the Farmers' Loan & Trust Co. of New York, which is a trustee for the mortgage creditors of the Cincinnati, Washington & Baltimore Co. The indebtedness upon which this suit was brought is the first issue of bonds, to the amount of $7,000,000, on which is an accrued interest amounting to $330,000. The Baltimore & Ohio was represented in the action, and acquiesced in the proceeding. The affidavit of the Secretary and Auditor of the road, attached to the petition, sets forth, among other things, that the bonded indebtedness of the road is $14,705,000, secured by two mortgages, on which the total fixed charges amount to $700,735. Unpaid coupons due amount to $710,842, with interest from the time they fell due. The road's present indebtedness is nearly $1,994,000. The company has also issued $7,500,000 income bonds, in addition to the indebtedness before mentioned. The Baltimore & Ohio is a creditor of the Cincinnati, Washington & Baltimore for $1,250,000 on judgments for supplies. Besides this, the Baltimore & Ohio holds about $2,000,000 in bonds.

The company is a reorganization of the Marietta & Cincinnati road. In the reorganization, which took place in February, 1883, the Cincinnati & Baltimore and the Baltimore Short Line roads, formerly leased, were purchased. The company operates 280 miles of road, of which 193 are included in the main line from Cincinnati to Belpre, Ohio.

Cloverport & Fordsville.—The work of constructing this road, from Fordsville, Ky., to Cloverport, Ky., 8 miles, has been begun by W. V. McCracken & Bro., now of Louisville, Ky. The road will be operated by the Louisville, St. Louis & Texas road, of which the McCracken Brothers are the owners.

Cornwall.—It is stated that the company is surveying a line from Mt. Hope, Pa., to Lititz, and thence to Lancaster, about 20 miles. The track of the Reading & Columbia is at present used.

Dallas, Archer & Pacific.—It is reported that the charter, right of way, etc., of this proposed Texas road is now held by one M. H. McLaurin, of New York. The road is to run from Dallas through Clay, Jack and Archer counties, to Archer, Tex. Four miles are graded and 20 more surveyed.

Danbury & Norwalk.—The Connecticut State Railroad Commissioners have approved the application of the road (which is controlled by the New York & New England) for the condemnation of nine acres of land at Wilson's Point, on Long Island Sound, near Norwalk. The land is for additional wharfage and track facilities for the New England Terminal Company.

Danville, Chicago & Northwestern.—The company has been chartered in Illinois to build a road from Danville, northwest to the north line of the state. The road will pass through the counties of Vermillion, Champaign, Iroquois, Ford, Livingston, La Salle, Lee, Ogler and Stevenson.

Deer Creek & Susquehanna.—John H. Miller, of Pittsburgh, Pa., has the contract to build the road from Belair, Md., to the Susquehanna River.

Duluth & Winnipeg.—The first 20 miles of the road from near Duluth have been completed and turned over to the operating department. It is stated that a construction company, with large capital, has been formed to complete the road.

Evansville & Richmond.—Wayne Township, Ind., last week voted to subscribe $115,000 more to this road. Two years ago a $90,000 subsidy was voted the same road, but the last subscription will guarantee the completion of the road.

Hawesville & Pellville Mineral.—As announced last week the survey for this road will be commenced this month. A line will be run from Hawesville to Beaver Dam, Ky., on the Chesapeake, Ohio & Southwestern, and there it is expected to meet the survey of the Bowling Green & Northern. The distance is about 45 miles. A survey is also to be made from Hawesville, on the Ohio River, toward Indianapolis. A bridge across the Ohio for the line is also proposed.

Helena, Tupelo & Decatur.—This road, which was chartered in Mississippi last spring to build a line from Helena, Ark., to Tupelo, Miss., and thence to Decatur, Ala., has recently secured a charter in Alabama. The survey for the line has been completed from Glendale, Miss., opposite Helena, to Tupelo, and it will be continued to Decatur next spring. H. C. Medford, of Tupelo, is secretary.

High Point, Randleman, Asheboro & Southern.—The company has let the contract for constructing the first section, from High Point, via Randleman to Asheboro, N. C., a distance of 26 miles. J. Elwood Wilcox, of High Point, N. C., is President.

Hudson County.—The company has recorded in Ulster County, N. Y., a mortgage for $80,000 made in favor of the Fidelity Trust & Safe Deposit Co., of Philadelphia.

Indianapolis Roads.—The Indianapolis *Journal* in its review of the past year gives the following information concerning the railroads centering in that city. Local freight traffic felt the reduction in coal seriously through the introduction of natural gas. In November, 1887, the Vandalia brought into Indianapolis 1,660 carloads of block coal, while in the same month of 1888 it brought but 310 carloads. The Indianapolis & Vincennes was not so much affected in its coal business, as from the mines on that road several Indianapolis roads are furnished with fuel for their locomotives. Live stock shows a sharp falling off, it being fully 30 per cent. lighter than in 1887. The car-works, the stave manufactories, the machine shops and the furniture factories have been busy through the year. There is no manufacturing point in the Union where the shipments have been so large and regular when compared with those of previous years as at Indianapolis. In passenger business, 1888 has been the banner year. In April business began in the way of excursions and picnics. In June the national conventions came in, and following them were the hundred thousand or more people who came here to visit General Harrison. Then there was the meeting of the Grand Army of the Republic at Columbus, and the State Fair, all combining to make passenger business heavy beyond parallel.

One of the best improvements of the year was the completion of the Union Station, which is unquestionably the finest building of this character in the country, costing, as it now stands, $1,193,000. There is still more to be done before the improvement is completed, according to the original plan, which includes the extension of the sheds one span further east and the construction of the viaduct.

The improvements made by the companies separately have been noticeable, those by the Cincinnati, Indianapolis, St. Louis & Chicago requiring the most money. The most important works it had were the freight station at Cincinnati, the construction of the North End cut-off, at a cost of $200,000, the lengthening of side-tracks and the building and repairing of stations. The Lake Erie & Western made extensive improvements, one being the building of an extension of 43 miles, letting the road into Peoria, and practically rebuilding the main line so far as bridges and main track are concerned. A good deal was also done in the way of replacing light with heavier steel rail. The Pee line has not done so much to its roadbed as in 1887, but in the way of equipments has expended a large sum of money, purchasing 6 new engines, 18 new passenger coaches and 400 freight cars. The Ohio, Indiana & Western laid a good deal of new steel rail, and all its track within the states of Indiana and Ohio is now of that material. It also built a freight depot here costing several thousand dollars, and shops in which 100 men are employed. The Indianapolis, Decatur & Western has completed the laying of its main line with steel rails and kept its shops busy in doing the regular work for the Woodruff Sleeping Car Co. It has also done considerable work for the Indiana Midland road in rebuilding engines. On the Pennsylvania lines little has been done except to keep the roadbeds up to their excellent standard. The Cincinnati, Hamilton & Indianapolis did the best business in its history. On the Belt road the traffic was highly satisfactory, enabling the company to pay a 6 per cent. dividend for the year and have something of a surplus. The Vandalia has had an unusually prosperous year, the loss of its coal traffic having been more than offset by traffic relations made with the Southwestern lines, which threw a heavy cotton and grain business on to the road the last few weeks.

It has been a good year with the express companies, the lower rates at which they are now carrying freights increasing the quantity that they carry. The heavy fruit crop all over the country proved a bonanza for them, and their money business was beyond all precedent. There are now six companies represented here, and 26 messengers come in and go out daily. To carry on the business locally 130 men are employed at the offices and the Union Station, and it requires four two-horse wagons and 24 single wagons to do the delivering, calling and depot work. The railroad shops located here and in which 1,000 men are employed, have been run steadily through the year, and, with the exception of two months, full time and full-handed.

The business transacted in the city during 1888 by the fifteen roads centring here shows a marked falling off in through traffic. A total of 818,873 loaded cars were handled, as compared with 874,812 in 1887. Local traffic was about the same as in the last two or three years. There was a marked decrease in business at the stock yards. The most noticeable feature of the exhibit is the increase in passenger traffic. In 1888, 40,890 trains arrived at the station, bringing in 309,410 coaches, while in 1887, the number of trains arriving was 39,598, with 296,433 coaches.

Jacksonville, Tampa & Key West.—In accordance with the terms of the lease, made last fall, the road on Jan. 1 commenced operating the lines of the Florida Southern, St. Johns, St. Augustine & Halifax River, and the St. John & Halifax River, all except the first being operated for the Jacksonville, St. Augustine & Halifax River road.

Kansas City & Pacific.—The extension from Vance northeast to Paola, Kan., 32 miles, has been completed. The road is now in operation from Coffeyville, on the southern line of Kansas, northeast to Paola, a distance of 125 miles. The road connects with nearly all the roads entering Kansas City from the south.

Lehigh & Hudson River.—Negotiations are said to be pending between the Pennsylvania and the Central of New Jersey for the joint use of the Lehigh & Hudson River road, which will give the Pennsylvania access to the Poughkeepsie Bridge. The road is now controlled by the Central of New Jersey.

Louisville, Madison & Cincinnati.—The company has organized at Madison, Ind., and will purchase the right of way and franchise of the Louisville, Cincinnati & Dayton, which extends from Middletown to Hamilton, O., 13 miles. The incorporators are Sidney E. Haigh and Charles Korbley, of Madison, and others.

Maine Central.—A syndicate has been formed, it is reported, for the purpose of building several extensions to the road in Northern and Northeastern Maine. A line from Enfield to Brownsville is one of the projects under contemplation.

Minneapolis & Pacific.—Some controversy has arisen in Minnesota over the issuing of income certificates by this road. These certificates were authorized to the amount of $20,000 per mile, being in fact a non-voting common stock entitled up to 8 per cent. of dividends, if earned, but such dividends were not to be cumulative in their nature. The Farmers' Alliance made charges that such certificates were issued in violation of the law. To this claim President Springer makes a reply that the certificates were issued in due form by a vote of the directors, ratified by a two-thirds majority of the stockholders, and he defines clearly the position that they occupy in the finances of the company. In view of the totally unsecured character of these certificates and the present business outlook of the road, the chance of holders being able to realize their 8 per cent. seems rather small, and the creditors of the road to whom they were issued must have been willing to accept most anything in return for their claims. The issue of this class of paper, while in some cases serving to stave off temporarily the evil day, always forms a source of weakness to a company, and destroys confidence in it financially, either because such certificates can have no voice in the reorganization of the property, or because if the company remains solvent it adds to the obligations extant.—*Railway Review.*

Missouri, Kansas & Texas.—The branch from Dallas to Hillsboro and Waco, Tex., has been completed from the former place to Lancaster, but work has been suspended there for the present, as an injunction has been secured preventing the company from proceeding with the work.

Montreal, Portland & Boston.—Action has been taken at Montreal by the company against the Canadian

Pacific to recover $1,850,000 for the use of the plaintiff's road since 1883. Action was also taken by the company against the Passumpsic Railroad Company to recover the value of stock to the amount of $175,000, which the plaintiff claims was appropriated by the defendant at the time of the transfer of the road.

New York, Philadelphia & Norfolk.—The contract which the road has had with the Pennsylvania for five years from Jan. 1, 1885, by which the latter for the first two years was to set aside 20 per cent. and the following three years 15 per cent. of the gross earnings on joint traffic has been extended for another five years at 10 per cent. of the gross earnings.

Northern California.—The extension southwesterly from Marysville to Grafton or Knight's Landing, on the Southern Pacific, a distance of 30 miles, has been graded to Nelson's Point on the Feather River about 18 miles. Work has been suspended here for the winter, but in the spring will be resumed and the line completed and opened for traffic next summer. A short extension from the northern terminus at Oroville is being built.

Northern Pacific.—In Jamestown, Dakota, this week, Judge Rose decided the Northern Pacific Railroad tax cases in favor of the counties. The particular cases in which decisions are made are suits of the company against the Treasurers of Foster and Lamours counties, in Dakota, for a perpetual injunction against the sale of railroad lands for the taxes of 1887. The decision also settles about 30 other suits of the same character brought by the company restraining the sale of its lands in both the indemnity belt and original counties along the line of the road in Dakota.

Ohio Valley.—The survey for the extension from Princeton, Ky., to Hopkinsville, Ky., has been completed, and work was last week begun at Princeton on the grading.

Owensboro, Falls of Rough & Green River.—The contract for the construction of this road from Owensboro, Ky., to Fordsville in Ohio County, Ky., was last week let to the Central Construction Co., of Henderson, Ky., of which C. H. Dishman is President. The road is to be in operation by Sept. 1, 1889.

Owensboro & Russellville.—Judge Barr, of the Federal Court, at Louisville, Ky., last week decided that the original bonds in aid of the road, issued by Daviess County, are valid to the amount of $250,000, all in excess of that amount being void; also that all the subsequent issues of bonds are void, except 185 additional $500 bonds issued by the county in 1870, which shall be worth $136 each. The suit was that of James M. Dickinson agt. Daviess County.

Philadelphia & Reading.—The company is building a three-mile road from its tracks near Pottsville, Pa., to Silverbrook, on the Lehigh Valley.

Richmond & Danville.—The Georgia Pacific having been leased to this company on Dec. 19, to take effect from Jan. 1, the Richmond & Danville on the latter date assumed the control and operation of the road.

Rio Grande & Utah.—The contract for grading of the first 10-mile section from Durango, Col., toward Albuquerque, N. M., has been let to Corrigan & Lipe, of Denver.

Rocky Fork & Cooke City.—This Montana company has been reorganized, and work is to be resumed on the line at Laurel, Mont. It is expected to be completed to the coalfields at Red Lodge by early spring. The proposed western terminus is at Cooke City, about 75 miles from Laurel. Samuel Hauser, of Helena, Mont., is President.

Rupert & Bloomsburg.—A charter has been granted in Pennsylvania to the company, with a capital stock of $100,000. The line will be two miles in length, extending from a point on the Catawissa & Williamsport branch of the Catawissa Railroad, near Rupert, to Bloomsburg, Columbia County.

St. Louis, Alton & Springfield.—Tracklaying on the extension of this road from Newbern to Alton, Ill., has been completed to the city limits of the latter place, but has there been suspended, as the Chicago & Alton has secured an injunction restraining the further extension of the road at that point. Despite the injunction the road secured an entrance into the city by pushing the tracks over against a bluff.

St. Louis, Omaha & Northwestern.—This line has now been surveyed from Plum Creek, Ralls County, Mo., to Leon, Ia., passing through Monroe City, Shelbyville, Locust Hill, Kirksville and Unionville. A committee has been appointed to obtain subscriptions to defray the expense of a survey from Plum Creek to Louisiana, Mo.

San Diego, Cuyamaca & Eastern.—Tracklaying will commence on this California road this month. The grading on the line from San Diego to Lakeside, Cal., 25 miles, is now nearly completed. The report that ex-Governor Waterman had transferred his controlling interest in the road to the Union Pacific is unfounded; but John I. Blair, of New Jersey, now holds the controlling interest.

San Francisco, Clear Lake & Humboldt.—The rumor that this company had passed into the control of the Southern Pacific has been confirmed. The line is projected to extend from Napo City to Clear Lake, Cal., about 75 miles.

San Francisco & North Pacific.—The bonds recently placed with Seligman Bros., of New York, were an issue of $4,000,000, at 5 per cent., running 30 years. The cost of building the extension of the main line from Cloverdale to Ukiah, will be $980,000, which will be met by a portion of these bonds.

Scranton & Forest City.—The preliminary survey for this road has been made between Forest City and Scranton, Pa., a distance of 22 miles. The right of way is now being secured.

Southern Pacific.—On the new coast line from Templeton south the grading has been completed for 18 miles, and when finished to Santa Margarita work will be suspended until the rainy season is over.

South Carolina.—Default was made Jan. 2 by the company on the interest on its second mortgage coupon bonds. The second mortgage bonds have dropped 25 points during the last week, and the income bonds have gone to a merely nominal quotation. There are about $1,000,000 of second mortgage bonds outstanding, most of which are held in New York and Baltimore. The entire issue is for $1,500,000. The first mortgage bonds amounted to $5,000,000. There are about $4,000,000 of stock outstanding, and about $3,000,000 of income bonds.

Stockton, Fresno & Southern.—The survey has been completed for this proposed California road, which it is proposed to build from Stockton southeast to Visalia, on the east side of the San Joaquin Valley. It is claimed that grading will soon be commenced. The Southern Pacific has already two lines in the San Joaquin Valley.

Ulster & Delaware.—The order giving the Attorney General of New York power to bring an action against the company to forfeit its charter, has been affirmed. The action is brought for failure of the company to complete its road to Oneonta, notwithstanding that the towns on the unconstructed line have paid for stock in the company.

Western Union Telegraph.—Attorney-General Kirkpatrick, of Pennsylvania, has filed an application before Judge Simonton, in Harrisburg, asking for a writ of quo warranto, citing the Western Union Telegraph Co., the Baltimore & Ohio Telegraph Co., and the Baltimore & Ohio Telegraph Co. of Pennsylvania, into court to show cause why they should not forfeit their stock, lines and franchises for violating the Constitution of the state by consolidating. The Attorney-General alleges that the Western Union has purchased the whole of the capital stock of the Baltimore & Ohio for $5,000,000, directly in violation of the Constitution. The Court granted the writ, making it returnable Jan. 29.

TRAFFIC AND EARNINGS.

Traffic Notes.

The Kansas City correspondent of the *Northwestern Lumberman* says that there is no question among lumbermen that the railroads from Northern points are in the habit of allowing rebates to the larger lumber shippers. The practice is said to consist in the making of "verbal agreements that claims for damages will be most generously considered."

A daily line of Pullman sleeping cars is now run between Jersey City and Charleston, S. C., over the Pennsylvania and Atlantic coast lines.

The competition between the three roads extending from Denver to Pueblo, Col., led to the reduction of the regular passenger rate of $4.65 between the two cities on Friday last, to 25 cents for the round trip. The cut was started by the Denver & Rio Grande (offering $1) and was immediately followed by the Atchison, Topeka & Santa Fe and the Denver, Texas & Fort Worth. The occasion was a proposed prize fight at Pueblo, and 2,000 or more people took advantage of the low rates.

East-Bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, Dec. 29, amounted to 90,409 tons, against 111,931 tons during the preceding week, a decrease of 21,522 tons, and against 62,725 tons during the corresponding week of 1887, an increase of 27,684 tons. The following table gives the proportions carried by each road:

	W'k to Dec. 22.		W'k to Dec. 29.	
	Tons.	P. c.	Tons.	P. c.
Wabash	5,409	4.8	5,075	5.9
Michigan Central	11,946	10.7	10,875	12.0
Lake Shore & Mich. So.	18,723	16.8	10,176	11.2
Pittsburgh, Ft. W. & Chicago	13,243	11.8	10,533	11.6
Chicago, St. L. & Pittsburgh	8,844	7.9	5,208	5.7
Baltimore & Ohio	12,677	11.3	12,695	14.0
Chicago & Grand Trunk	15,472	13.8	12,904	14.3
N. Y., Chicago & St. Louis	11,168	10.0	11,960	13.2
Chicago & Atlantic	14,45)	12.9	10,983	12.1
Total	111,931	100.0	90,409	100.0

Of the above shipments 6,979 tons were flour, 59,739 tons grain, 2,337 tons millstuff, 4,138 tons cured meats, 1,522 tons lard, 7,197 tons dressed beef, 1,087 tons flaxseed, 742 tons butter, 1,475 tons hides, 233 tons wool, and 2,348 tons lumber. The three Vanderbilt lines carried 36.4 p. c., and the two Pennsylvania lines secured 17.3 p. c.

Cotton.

The cotton movement for the week ending Dec. 28 is reported as follows, in bales:

	1888.	1887.	Inc. or Dec.	P.c.
Interior markets:				
Receipts	163,561	90,570	I. 72,991	80.6
Shipments	130,884	106,365	I. 24,519	23.0
Stock	460,024	493,883	D. 33,859	6.8
Seaports:				
Receipts	240,042	188,824	I. 51,218	27.1
Exports	142,528	130,098	I. 12,430	9.5
Stock	933,323	1,066,472	D. 131,149	12.5

Coal.

The coal tonnages for the week ending Dec. 22 are reported as follows, in tons:

	1888.	1887.	Inc. or Dec.	P. c.
Anthracite	618,534	693,761	D. 75,227	10.8
Bituminous	337,933	336,219	I. 1,714	.5

The coal and coke tonnage of the Pennsylvania originating on lines east of Pittsburgh and Erie for the week ending Dec. 22, and the year to that date, was as follows:

	Coal.	Coke.	Total.
Total for week ending Dec. 22	206,549	88,214	294,763
Total for year 1888 to date	11,395,759	4,032,844	15,428,603
Total for year 1887 to date	10,219,717	3,665,899	13,885,616

The anthracite coal tonnage of the Belvidere division of the United Railroads of New Jersey division for the same periods was as follows:

	1888.	1887.	Inc. or Dec.
Total for week	29,402	39,389	D. 9,986
Total for year	1,646,516	1,552,718	I. 93,797

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

NEW YORK, LAKE ERIE & WESTERN.

Month of November:	1888.	1887.	Inc. or Dec.
Gross earnings	$2,250,521	$2,390,397	D. $2,260,298
Oper. expenses	1,413,898	1,576,159	D. 1,446,635
Net earnings	$836,623	$814,238	I. $813,663
Less proportion due leased lines	202,008	207,149	D. 187,654
Net earnings	$634,615	$607,089	I. $626,009
Oct. 1 to Nov. 30:			
Gross earnings	$4,691,224	$4,940,406	D. $4,822,614
Oper. expenses	2,870,944	3,104,269	D. 3,000,523
Net earnings	$1,820,280	$1,836,137	D. $1,822,091
Less proportion due leased lines	407,852	447,942	D. 409,612
Net earnings	$1,412,428	$1,388,195	I. $1,412,479

NORFOLK & WESTERN.

November, 1888:			
Earnings from passen., mail, exp	$83,096	$69,704	I. $13,392
Freight	344,601	340,508	I. 4,093
Gross earnings	$427,697	$410,212	I. $17,485
Expenses, taxes	276,344	231,819	I. 44,525
Net earnings	$151,353	$178,393	D. $27,040
P. c. of ex. to gross earn.	64	57	

Eleven months—Jan. 1 to Nov. 30:	1888.	1887.	Inc. or Dec.
Earnings from passen., mail, exp	$911,716	$736,793	I. $174,923
Freight	3,578,156	3,111,573	I. 466,583
Gross earnings	$4,489,872	$3,848,366	I. $641,505
Expenses, taxes	2,738,916	2,259,411	I. 479,504
Net earnings	$1,750,956	$1,588,955	I. $162,001
P. c. of exp to gross earn.	61	59	

NEW YORK CENTRAL & HUDSON RIVER.

Quarter ending December 31:			
Gross earnings	$9,170,000		$10,020,225
Oper. expenses	5,975,000		6,470,510
Net earnings	$3,195,000		$3,549,715
Fixed charges	1,963,280		1,954,860
Profit	$1,231,720		$1,594,855
Dividend	894,283		894,283
Surplus	$337,437		$700,572

CENTRAL OF NEW JERSEY.

Month of November:				
Gross earnings	$1,174,567	$950,608	I.	$228,959
Oper. expenses	617,356	567,784	I.	49,572
Net earnings	$557,211	$382,824	I.	$174,387
Jan. 1 to Nov. 30:				
Gross earnings	$12,200,261	$10,432,196	I.	$1,768,065
Oper. expenses	6,611,493	5,857,080	I.	754,413
Net earnings	$5,588,768	$4,575,116	I.	$1,013,652

ALLEGHENY VALLEY.

Month of November:				
Gross earnings	$197,268	$173,830	I.	$23,438
Oper. expenses	98,206	96,481	I.	1,725
Net earnings	$99,062	$77,349	I.	$21,713
Eleven months—Jan. 1 to Nov. 30:				
Gross earnings	$1,915,421	$1,850,060	I.	$65,361
Oper. expenses	1,090,660	1,126,018	D.	35,358
Net earnings	$824,761	$724,042	I.	$100,719

LOUISVILLE & NASHVILLE.

Month of November:				
Gross earnings	$1,341,787	$1,501,898	D.	$160,111
Oper. expenses	842,117	875,616	D.	33,499
Net earnings	$499,670	$626,282	D.	$126,612
July 1 to Nov. 30:				
Gross earnings	$6,853,034	$7,174,737	D.	$321,703
Oper. expenses	4,284,501	4,229,097	I.	55,404
Net earnings	$2,568,533	$2,945,640	D.	$377,107

ATCHISON, TOPEKA & SANTA FE.

Month of November:				
Miles of road operated	3,025	2,942	I.	83
Gross earnings	$1,460,371	$1,657,078	D.	$196,706
Oper. expen. less taxes	829,590	827,295	I.	2,295
Net earnings	$630,781	$829,783	D.	$199,001
Eleven months—Jan. 1 to Nov. 30:				
Miles of road operated	3,020	2,592	I.	428
Gross earnings	$14,260,107	$16,965,412	D.	$2,705,305
Oper. expen. less taxes	9,618,056	9,037,176	I.	580,880
Net earnings	$4,642,051	$7,928,236	D.	$3,286,185

Month of November:	1888.	1887.	Inc. or Dec.	P.c.
Balt. & Potomac	$141,062	$128,816	I.	$12,246 9.5
Net	59,100	45,344	I.	13,756 30.3
Camden, & Atl. & brs.	36,906	34,618	I.	2,288 6.6
Net	def. 1,803	def. 7,475	I.	9,278 ...
Cen. of New Jersey	1,174,567	950,608	I.	223,959 23.6
Net	557,211	382,824	I.	174,387 45.6
Clev., Col., Cin. & In.	613,473	737,314	D.	123,841 16.8
Net	195,982	276,154	D.	80,172 29.0
Det., Bay C. & Alp.	32,994	31,093	I.	1,901 6.1
Net	10,481	13,666	D.	3,185 23.3
Memphis & Charles	146,224	191,023	D.	44,799 23.5
Net	15,228	59,674	D.	44,476 74.4
Mexican Central	416,726	468,089	D.	51,363 11.0
Net	190,426	205,759	D.	15,333 7.5
Guadalajara Div.	37,676	.....	..	....
Net	19,976	.....	..	....
San Luis Potosi D.	5,488	.....	..	....
Net	1,931	.....	..	....
Northern Central	488,114	542,158	D.	54,044 10.0
Net	125,513	102,177	I.	23,336 22.8
Pennsylvania	4,860,852	4,735,154	I.	125,698 2.7
Net	1,473,797	1,356,190	I.	117,607 8.2
Petersburg	32,810	31,404	I.	1,406 4.5
Net	16,298	10,352	I.	5,946 57.1
Rich. & Petersburg	24,821	20,175	I.	4,646 23.0
Net	11,534	9,837	I.	1,697 17.3
Staten Isl. Rap. Tr.	52,791	51,651	I.	1,140 2.2
Net	1,615	7,414	D.	5,799 78.4
Wisconsin Central	335,706	335,539	I.	167 ....
Net	105,495	.....	..	....
West Jersey & brs.	101,012	98,959	I.	2,053 2.1
Net	11,611	13,602	D.	1,991 14.6
Month of October:				
Denver & Rio Grande	$732,803	$797,565	D.	$64,762 8.1
Net	283,029	356,347	D.	73,318 20.5
Lake Erie & Western	221,157	202,795	I.	18,362 9.1
Net	95,411	91,729	I.	3,682 4.0
Eleven months—Jan. 1 to Nov. 30:				
Balt. & Potomac	$1,425,900	$1,326,350	I.	$99,550 7.5
Net	495,317	501,843	D.	6,526 1.3
Camden & Atl. & br.	660,729	644,920	I.	15,809 2.5
Net	133,244	144,878	D.	11,634 8.0
Central of N. Jersey	12,200,261	10,432,196	I.	1,768,065 17.0
Net	5,588,768	4,575,116	I.	1,013,652 22.2
Clev., Col., Cin. & I.	6,936,530	7,310,498	D.	373,968 5.1
Net	2,049,048	2,540,563	D.	491,518 19.3
Det., Bay C. & Alp.	428,115	435,665	D.	7,550 1.7
Net	156,652	193,222	D.	36,570 18.9
Mem. & Charles	1,394,068	1,550,197	D.	156,129 10.1
Net	202,517	365,354	D.	162,837 44.5
Mexican Central	5,035,116	4,346,524	I.	688,592 15.8
Net	1,978,737	1,882,355	I.	96,382 5.1
Northern Central	5,703,857	5,772,641	D.	68,784 1.1
Net	1,819,953	1,883,673	D.	63,720 3.4
Pennsylvania	53,363,985	50,778,349	I.	2,585,636 5.1
Net	17,645,076	17,202,833	I.	442,243 2.6
Petersburg	379,215	327,275	I.	51,940 15.9
Net	119,032	113,381	I.	5,651 5.0
Rich. & Petersburg	243,615	212,013	I.	31,602 14.9
Net	77,673	88,014	D.	10,341 11.8
Staten Island Rap. T.	856,890	804,823	I.	52,067 6.5
Net	255,134	225,752	I.	29,382 13.0
Wisconsin Central	3,535,674	3,444,919	I.	90,755 2.5
Net	.....	.....	..	....
West Jersey & br.	1,459,188	1,370,319	I.	88,869 6.5
Net	500,308	496,925	I.	3,383 .6
Ten months—Jan. 1 to Oct. 31:				
Den. & Rio Grande	$6,386,466	$6,518,857	D.	132,391 2.0
Net	2,113,423	2,703,395	D.	589,972 21.8
Lake Erie & Western	1,783,207	1,752,806	I.	30,401 1.7
Net	652,249	688,621	D.	36,372 5.2

Early reports of monthly earnings are usually estimated in part, and are subject to correction by later statements.